INFLAMMATORYAND DEGENERATIVE DISEASES INCONTEXTOF PHYSIOTHERAPY: A SYSTEMATIC LITERATURE REVIEW

ABSTRACT

Understanding inflammatory and degenerative diseases is essential in the field of physiotherapy, as this area of health plays a fundamental role in alleviatingsymptoms and improving the quality of life of affected patients. The main aim of this systematic review was to investigate the physiotherapy interventions used in the treatment of inflammatory and degenerative diseases, with a focus on arthritis, osteoarthritis, arthroplasty, degenerative discopathy, herniated discs, spondylosis, osteo-metabolicdiseases(osteoporosis,osteomalacia,scurvy,rickets)andtheirmain treatment protocols. The search was carried out in the following databases: LILACS; BDEnf and MEDLINE, using MeSH (*Medical Subject Headings*) terms and keywords related to the 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 the search descriptors were added to the selected databases, 227 studies were found. However, after applying the inclusion criteria, 207 studies were discarded. Of these, 62 were published before 2013, 59 were not in the established languages, 2 were incomplete and 84 did not meet the proposed objectives. We therefore selected 20 relevant articles. Finally, it was concluded that the challenges in applying physiotherapy in these conditions are multifaceted and require an equally complex response. Opportunities forimprovement include the adoption of evidence-based practices, technological integration, ongoing research, innovative treatments and a personalised, multidisciplinary treatment approach.

Keywords: Degenerativediseases;inflammatorydiseasesand physiotherapy.

INTRODUCTION

Physiotherapy is an extremely important part of ensuring the patient's well-being and providing relief from symptoms. In addition, it is of great importance to further investigate the involvement of these diseases [1].

Research into these diseases provides in-depth knowledge of their symptoms and characteristics. Inflammatory diseases are known to trigger pain, swelling and lesions, but degenerative conditions cause gradual wear and tear of body structures and their functioning, which is very common among the elderly [2].

Physiotherapy has the opportunity to study advances in treatment and understand these problems, and physiotherapists can create treatment plans for these patients, thus enabling these therapeutic resources to be more efficient and effective [3].

Thus, inflammatory diseases focus on minimising pain and maintaining joint movement, while degenerative diseases focus on slowing down the progression of the disease. Therefore, physiotherapists work from prevention to treatment of these conditions [1].

Therefore, knowledge of inflammatory and degenerative diseases and their effective treatment has become increasingly vital. These conditions have a profound impact on patients' well-being. Inflammatory diseases, such as rheumatoid arthritis, are characterised by an exaggerated immune response that results in inflammation and tissue damage. On the other hand, degenerative diseases, such asosteoarthritis, involve the gradual deterioration of tissues, especially in the joints [4].

THEORETICALFRAMEWORK

Exploring inflammatory and degenerative diseases and their effectivetreatment has become increasingly critical in the health sciences. 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 rheumatoid arthritis, a condition 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 the tissues with thetime, 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.

PhysiotherapyintheTreatmentofInflammatoryandDegenerativeDiseases

Physiotherapy is essential in tackling 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 long-term damage, especially to the joints [5].

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

Themanagementofthesediseasesrequirestheintroductionofphysiotherapy, which is appropriate not only for relieving symptoms, but also for preventing the pathology from worsening and thus improving the usefulness of these patients. The main aims of physiotherapy include reducing pain, increasing range of motion, increasing muscle strength, reducing deformities and ensuring self-sufficiency in patients' daily lives [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, joint mobilisations are currentlyused to increase or maintain mobility in the affected joints, and manual therapies, including massage, can be administered to relieve muscle tension and reduce pain [4].

METHODOLOGY

DefinitionoftheResearchProblem

Themainaimofthissystematicreviewistoinvestigatethephysiotherapyinterventions used in the treatment of inflammatory and degenerative diseases,with a focus on arthritis, osteoarthritis, arthroplasty, degenerative discopathy, herniated discs, spondylosis, osteo-metabolic diseases (osteoporosis, osteomalacia, scurvy, rickets) and their main treatment protocols.

SearchStrategy

The research was carried out in the following databases: Latin American and

Caribbean Health Sciences Literature (LILACS); Specialised Bibliographic Database in the Nursing Area (BDEnf) and *Medical Literature Analysis and Retrieval System Online (*MEDLINE), using MeSH (Medical Subject Headings) terms and keywords related to the topics of interest, such as: "Degenerative diseases"; "inflammatory diseases" and "physiotherapy".

InclusionandExclusionCriteria

We included original studies published in the last 10 years in English and Portuguese that addressed the use of physiotherapy in the treatment of theconditions mentioned. Studies in languages other than those specified, studies not related to the topic, case reports and editorials were excluded.

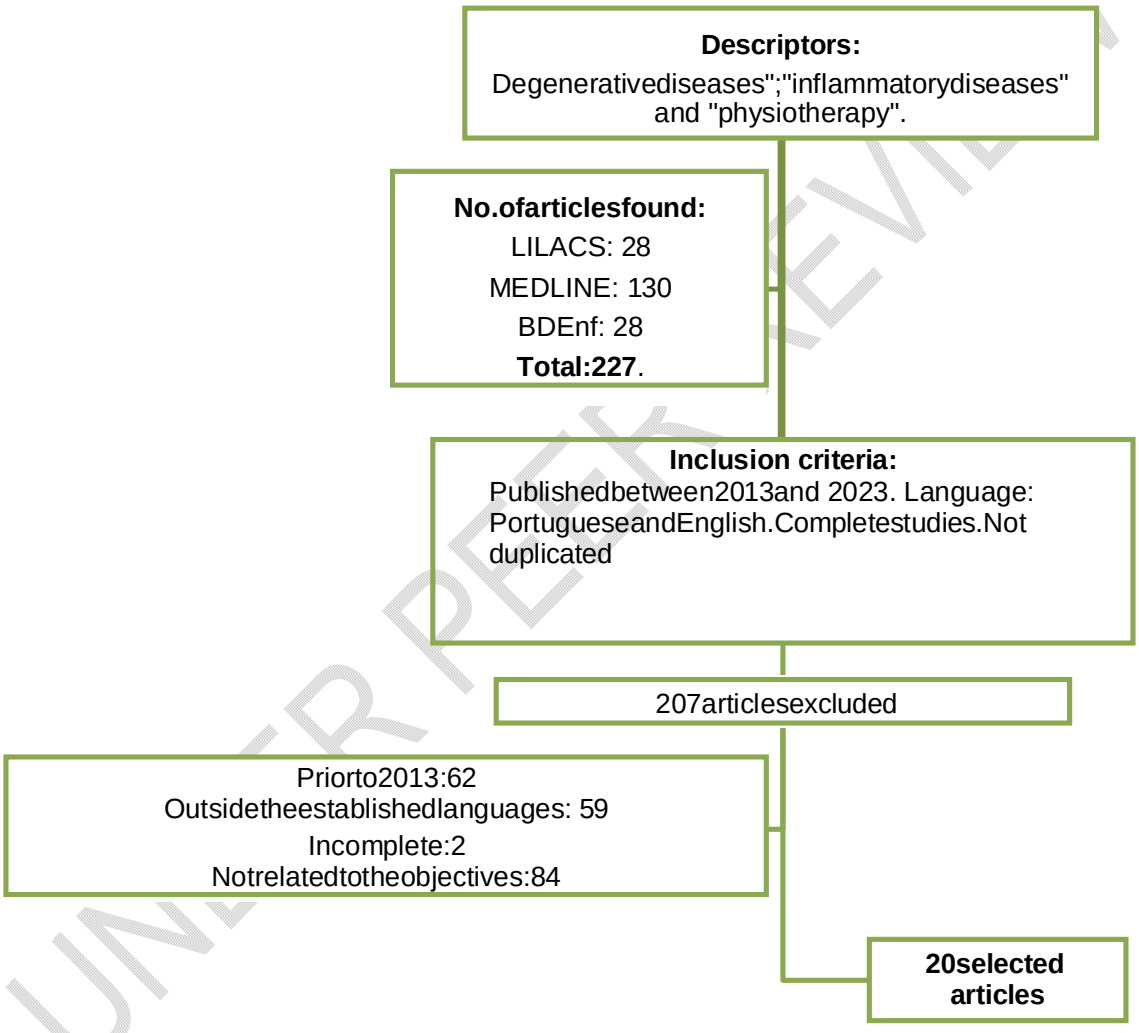
DataExtraction,SynthesisandAnalysis

The data extracted was analysed qualitatively to identify patterns, gaps in the literature and trends in the use of physiotherapy for the diseases studied. Tables and graphs will be drawn up to present the main findings in a clear and concise manner.

RESULTSANDDISCUSSION

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 and84didnotmeetthepropose dobjectives.Wethereforeselected20relevantarticles, as shown in Figure 1.

Figure1.Flowchartofstudyselection.



Source: Preparedbytheauthors.

Theselectedstudiesare presentedin Table1andorganisedinchronological order, showing authorship, source, type of publication, relationship with the research objectives, methodological approach and main findings.

Table1.Organizationoftheselectedstudies.

AUTHOR/YEAR	SOURCE	TYPE OF PUBLICATION	RELATIONSHIP WITH OBJECTIVES DA RESEARCH	METHODOLOGICAL APPROACH	MAINFINDINGS
NalleJunior*etal.*[6]	Health society	Article	Yes	Review documentary	Theresultsoftheresearchconsiderthe osteoporosispreventioneconomicallyviable,for by tracking bone microarchitecture
Bennell *et al.* [7]	PT, Pain, Function, and Hip Osteoarthritis	Article	Yes	Clinical trials randomised	Amongadultswithpainfulosteoarthritisofthehip,the physiotherapydidnotresultingreaterimprovementin painorin functioncomparedtothesimulatedtreatment, raisingquestionsabouttheir value to these patients.
Nam *et al.* [8]	J Bone Joint Surg Am	Article	Yes	Review of literature	Surgicalattemptstorestorethemechanism kneeextensorsaregenerallyjustified;inthe however, the results results treatment ofthese complicationsareoftenunsatisfactoryandmanagement of the patient's expectations is important.
Domb *et al.* [9]	The Journal of Arthroplasty	Article	Yes	Study experimental	Techniquesguidedbyroboticsandnavigationwere more consistent than other techniques in placing oftheacetabularcupinLewinnek'ssafezone.A robot-guidedsurgerywasmoreconsistentinrelationto to the Callanan safe zone.
Fischer *et al.*[10]	Oxidative medicineand cellular longevity	Article	Yes	Reviewof literature	Theinterrelationshipbetweenoxidativestressand inflammationin twomainchronicneurodegenerativediseases, Alzheimer'sdiseaseandParkinson'sdisease,andwas ducedthedualroleofTNFinthepromotionof neurodegenerationandtissueregenerationthrough its two receivers.

Marques; Castanhetti;Fan[11]	InovaSaúde Magazine	Article	Yes	Casestudies	TheapplicationofthePilatesMethodwasimportantin reducinglowerbackpainandincreasingabdominal muscle strengthof the patients and positive changes were obtained in the VAS and QNSO results.

Kavanaugh*etal.*[12]	Clinicaland epidemiological research	Article	Yes	ClinicalstudyP	Apatientswithbaselineperipheralarthritisand	doctor-reported spondylitis, patients treated with ustecinumab showed significant improvements in axial signs and symptoms by week 24.
Radominski*etal.*[13]	Journal brazilian rheumatology	Article	Yes	Literaturereview		The main aim of osteoporosis treatment is to prevent fractures.Identifyingthisat-riskpopulationthroughearly diagnosis and treatment is of fundamental importance.
Madera *et al.*[14]	Journal of Neurosurgery: Spine	Article	Yes	Systematic review		Rehabilitation has been a common feature in the post-operative management of patients undergoing spinal fusion. Although carers from various disciplines agree that the majority of their patients will benefit from this effort, supporting data remains scarce.
Iolasco *et al*. [15]	Rehabilitation Medicine for Elderly Patients	Article	Yes	Literaturereview		The key element of rehabilitation is therapeutic exercise, particularly resistancetraining,whichiseffectiveinbothmaintaining bone health and improving muscle performance.
Huang *et al.*[16]	Rheumatology	Article	Yes	Review of literature		He presented recent advances in the diagnosis and treatment of osteoarthritis, highlighting innovative therapies under development.
Rezus*et al.*[4]	International Journal of Molecular Sciences	Article	Yes	Literaturereview		Themechanismofarticularcartilagedegenerationisnot necessarily a consequence of ageing, but ageing is considered a risk factor for the occurrence of OA. There is a close relationship between the activity of chondrocytesandchangesinthelocaljointenvironment due to cellular senescence followed by the secretion of inflammatory mediators. In addition, inflammationsystemic can lead to cartilagedestruction,pain, disability and reduced quality of life.

Konget*al.*[5]	Risk management and healthcare policy	Article	Yes	Retrospective Study	Takingintoaccountdiscdegeneration,M/D,fatty infiltrationoftheparavertebralmuscles,sROM,ISA,LL, BMIandphysicalloadintensitybeforesurgerycan contributetothepreventionofrLDHafterPETDand leadtoamoresatisfactoryoperativeoutcomeandthe developmentofareasonablerehabilitationprogramme after discharge.
Chen*et al.*[17]	PLoS One	Article	Yes	Study retrospective	The outside-in technique may be superior to the inside-outtechnique.Olderageandalcoholusemaybe associatedwithahigherrateof reoperation
Dantas; Salvini; Mcalindon[18]	Brazilian Journal of Physical	Article	YesLiteraturereview		Thereisaneedforhealthcareprofessionalstoabandon low-qualityandineffectivetreatmentsandeducate themselvesandtheirpatientsoncurrentevidence-
Upadhya*et al.*[19]	Therapy Journalof Controlled Release	Article	YesLiteraturereview		basedbestpracticesforkneeOA PeriodicanalysesofADEVsinthebloodareusefulfor detecting astrocyte-specific biomarkers in different neurologicalconditionsandformonitoringdisease progressionandremissionwithdifferenttherapeutic approaches.
Shah;Shinde[20]	D Y Patil Journal of Health Sciences	Article	YesSystematicreview		Ithasbeenshownthatregularexercisecanhelpto arthritis,goutandotherconditions.
Chu; Williams[21]	Frontiersin Physiology				Analysis of miRNA targets shows that theconsequences resulting from changes in miRNA levels include cytokine release, chronic activation of the immune response, increased apoptosis and

		Article	Yes	Literature review	commitment of cell functionof astrocytesandcellsthatingestADEV.
Quicke*etal.*[22]	Osteoarthritis and Cartilage	Article	Yes	Literature review	Itanalysedtheincidenceandriskfactorsassociatedwith osteomalacia and scurvy, as well as reviewing the options for treatment. treatment available.
Wu *et al.*[23]	Journal of Orthopaedic Translation	Article	Yes	Systematic review	Treatment strategies based on native exosomes are effective,buthaveseveraldisadvantages,suchasrapid diffusion and insufficient and fluctuating functional content. Modified exosome-based strategies can better meet the requirements of the regenerationinsomecomplexhealingprocesses
Santos *et al.* [24]	Brazilian Journal of Implantology and Health Sciences	Article	Yes	Literature review	He compared the techniques and results of shoulder, elbow, hand, hip, knee and ankle arthroplasties, highlighting the best practices.

Source: Authors (2024).

The analyses in Table 1 provide information on the management of inflammatory and degenerative diseases in the context of physiotherapy. Among the findings, it is worth highlighting the economic viability of preventing osteoporosis through the process of bone microarchitecture, treatment with ustecinumab for patients with peripheral arthritis and spondylitis, the significance of managing patient waiting to use surgery to restore the knee extensor mechanism, and the importance of pilates in the loss of low back pain and in increasing abdominal muscle strength.

In addition, the research addresses topics 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 post-operative rehabilitation strategies for patients undergoing spinal fusion.

The clinical study therefore discusses the benefits of many therapeutic approaches, such as physiotherapy for hip osteoarthritis and robot-assisted surgery for acetabular cup placement. In addition, issues relating to the prudence of post-operative complications, risk factors associated with recovery and the significance of evidence-based education for healthcare professionals in the treatment of osteoarthritis are addressed.

DISCUSSION

Diseases whose 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 treating and improving the quality of life of these individuals, through a variety of interventions that address pain, reduce inflammation, improve joint function and prevent future damage, is discussed.

EffectivenessofPhysiotherapyInterventionsinInflammatoryandDegenerativeDiseases

Treating degenerative and inflammatory diseases that affect the musculoskeletal system is a challenge for both the patient and the health professional, and physiotherapists are therefore called upon to play a crucial role in re-establishing the patient's well-being [10].

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 [14].

In this context, NalleJunior *etal*.[6]emphasised the importance ofmonitoring bone microarchitecture to prevent fractures and other complications is emphasised by the economic viability of preventing osteoporosis. This notion is further supported by Radominski *et al*. [13], whoprioritisedthepreventionoffracturesasafundamentalobjectiveinthetreatment of osteoporosis, emphasising the importance of early detection and intervention inorderto identifyhigh-riskindividuals.

Furthermore, Bennell *et al*. [7] presented a thought-provoking finding that physiotherapy did not produce a notable improvement in pain or function in adults suffering from hip osteoarthritis when compared to a placebo treatment, suggesting that there is a need to re-evaluate or incorporate additional interventions into physiotherapy approaches for certain patients. Nam *et al*. [8] also emphasised the importance of managing patient expectations, as they highlight the often unsatisfactory results of surgical restorations of the knee extensor mechanism. This underlines the importance of physiotherapy as a crucial component of a comprehensive disease management strategy.

According to Domb *et al* [9], the use of robotics and navigation in surgical procedures can increase the level of technical precision, which in turn has a positive impact on post-operative rehabilitation. Madera et al. [14] also emphasised the need for further research to optimise rehabilitation protocols specifically for spinal fusions.

The study conducted by Kavanaugh *et al*. [12] where they investigated the effectiveness ofustecinumab as a pharmacological treatment for individuals suffering from psoriatic arthritis, this research highlights the substantial impact that pharmaceutical interventions can have on relieving the signs and symptoms of the disease, in addition, thestudysuggeststhat,whencombinedwithphysiotherapy,theseinterventionscanlead to

even more comprehensive improvements in patients' overall quality of life.

According to Huang *et al* [16], there have been significant advances in boththe diagnosis and treatment of osteoarthritis. These advances encompass not only innovative therapies, but also the integration of these therapies into physiotherapy interventions, thus offering a comprehensive approach to tackling the disease. In addition, Chen *et al*. [17] and Kong et al. [5] have contributed valuable insights into surgical techniques and preoperative factors that can potentially impact surgical outcomes and the subsequent rehabilitation process.

The importance of healthcare professionals adopting evidence-basedpractices was emphasised by Dantas, Salvini and Mcalindon [18]. This perspective is supported by the research conducted by Shah and Shinde [20], who highlighted the positive impact of regular exercise on patients with arthritis, as well as the comprehensive review conducted by Quicke *et al*. [22], who examined treatments for diseases such as osteomalacia and scurvy.

The systematic review by Wu *et al* [23] moved towards a new approach by discussing exosome-based approaches, which, although successful, have shortcomings such as rapid diffusion rate and variation in functional capabilities. This research suggests that altered exosome-based strategies are more effective for complex healing processes, which indicates the potential for a collaboration between physiotherapy and regenerative therapies.

In addition, Santos *et al*. [24] offered a beneficial comparison of different arthroplasty techniques for different joints, highlighting the best practices that can be incorporated into the physiotherapy rehabilitation process in order to guarantee the effectiveness of treatments and the recovery of patients.

It is important to recognise that while some research suggests the effectiveness of certain physiotherapy treatments, others advocate critical evaluation and the search for alternative treatments. Chu and Williams' assessment of the impact of miRNAs on inflammation and cellular function suggests a molecular mechanism that could be sought in the future to improve the physiotherapeutic effectiveness of treatments.

Ultimately, the systematic review by Shah and Shinde [20] showed that exercise is routinely performed as a form of treatment for painand to improve the function of patients with arthritis. This statement is supported by research demonstrating the effectiveness of specific exercises, such as the Pilates Method, in

relieving lower back pain and improving muscle function.

PhysiotherapyTreatmentProtocolsforDifferentConditions

Inthefieldofphysiotherapy,therearearangeoftreatmentprotocolsdesigned specifically for musculoskeletal conditions, including arthritis, osteoarthritis, degenerative disc disease, herniated discs, spondylosis and osteometabolic diseases. 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 scrutinised through rigorous clinical studies and comprehensive literature reviews, which are conducted with the aim of scientifically validating the practices adopted [18].

Physiotherapy is often used as a treatment for osteoarthritis, with interventions such as muscle strengthening exercises, proprioception training and pain-relieving techniques such as thermotherapy and electrotherapy. However, a study by Bennell *et al* [7] challenged the effectiveness of these practices. The research found that physiotherapy 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 personalised treatment protocols and a combination of multidisciplinary approaches may be necessary for the effective management of this condition, aligning with Dantas, Salvini and Mcalindon's [18] recommendation to educate professionals and patients about evidence-based best practices for treating knee osteoarthritis. Regular physical activity has been consistently recommended as part of arthritis treatment, with Shah and Shinde [20] emphasising its ability to relieve pain and improve functionality. This finding is supported by Iolasco *et al*. [15], who emphasised 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 asosteoporosis, the main objective of which, according to Radominski *et al* [13], is the prevention of fractures.

Optimising physiotherapy treatment protocols in the post-arthroplasty rehabilitation process is a crucial aspect, as emphasised by Santos et al [24]. They emphasise the importance of comparing techniques and results in different joints. Similarly,Madera*etal*.[14]recognisedthelimitedavailabilityofsubstantialevidence, but agree that most patients show positive results through post-operative physiotherapy,

highlighting the importance of rehabilitation in these cases.

In the field of specific spinal diseases, such as degenerative disc disease, disc herniation and spondylosis, the physiotherapy course can cover various approaches, including spinal traction, exercises to increase mobility and strength and techniques to control pain Kong *et al*. [5] emphasised the importance of taking into account 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.

According to Fischer *et al* [10], who highlighted the prevalence of oxidative stress and inflammation in neurodegenerative diseases, physiotherapy plays a supportive role in symptom management. Its strategies aim to improve function and relieve pain, while recognising that the main focus remains on pharmacological and other biomedical treatments.

In their study, Wu *et al* [23] discussed the potential of exosome-based treatment strategies, which offer a hopeful outlook for the future of physiotherapy. These advances in regenerative medicine can be seamlessly integrated into treatmentprotocolsforcomplexdiseases,enablinginnovativeapproachestoimprove patient outcomes.

ImpactofPhysiotherapyonPatients'RecoveryandQualityof Life

As a health science, physiotherapy focuses on harnessing the body's innate healing capacity and aims to improve functional recovery, relieve pain and ultimately improve patients' general well-being. In cases of inflammatory and degenerative diseases, physiotherapy plays a crucial role not only in treating the immediate symptoms, but also in preventing complications future,providingtrainingindiseasemanagementandpromotingahealthierandmore independent lifestyle [13].

Physiotherapy plays a crucial role in preventing osteoporosis, a condition that can be treated through early intervention. In a study by Nalle Junior et al [6], they emphasised the economic viability of a preventive approach to osteoporosis, namely by monitoring bone microarchitecture. This is in line with the findings of Radominski*et al*. [13], who emphasised the importance of fracture prevention as the main objective in the treatment of osteoporosis. Strengthening and balance exercises are among the

interventions recommended to prevent falls and fractures.

The study by Bennell *et al* [7] raised doubts about the effectiveness of physiotherapy in the treatment of hip osteoarthritis. Their findings showed no significant differences in pain or function between patients who received physiotherapy and those who underwent simulated treatment. However, it isimportant not to rule out physiotherapy altogether, as highlighted by Dantas, Salvini and Mcalindon [18], who emphasised the importance of healthcare professionals and patients keeping abreast of the latest evidence-based practices. This suggests the need for more individualised treatment approaches and the potential integration of innovative therapies, as discussed by Huang *et al* [16] who explored promising newtreatments being developed specifically for osteoarthritis.

When it comes to post-operative complications, specifically those related tothe restoration of the knee extensor mechanism documented by Nam *et al* [8], physiotherapy is essential for rehabilitation. It aids in the recovery of range of motion and muscle strength, as well as the recovery process after arthroplasty, emphasised by Santos et al [24], who stressed the importance of using optimal techniques in arthroplasty.

With this in mind, Marques, Castanhetti and Fan [11] delved into the Pilates Method,aphysiotherapyinterventionthathasprovedeffectiveinrelievinglowerback pain and increasing the strength of the abdominal muscles. This positive result is reflected in the results of the pain visual analogue scale (VAS) and overall quality of life. These findings suggest that therapeutic techniques that prioritise core strengthening and stability may be advantageous for individuals suffering from spinal diseases such as herniated discs and spondylosis.

The value of physiotherapy in the post-operative rehabilitation of patients undergoing spinal fusion is highlighted in the research carried out by Madera et al [14]. Although there may be a dearth of empirical evidence, professionals in the field widely agree on the benefits of physiotherapy, a sentiment echoed by the emphasis placed on therapeutic exercise as a crucial component of rehabilitation [15].

In addition, research by Rezus *et al* [4] has shed light on the process of articular cartilage deterioration and the interconnection between chondrocytefunction, changes in the joint environment and systemic inflammation. These findings provide valuable information for physiotherapeutic approaches aimed at controlling inflammation and preserving cartilage.

ChallengesandOpportunitiesintheApplicationofPhysiotherapyintheseConditions

When it comes to conditions such as arthritis, osteoarthritis, arthroplasty, degenerative disc disease, disc herniation, spondylosis and osteo metabolic diseases, physiotherapy, as a health science, encounters a multifaceted scenario. These diseases, which have a direct impact on patients' quality of life, present substantial obstacles in terms of the effectiveness of treatment and the financial viability of healthcare systems [17].

The economic viability of a preventive strategy for osteoporosis wasunderlined by Nalle Junior *et al* [6], with particular emphasis on monitoring bone microarchitecture, thus emphasising the importance of prevention and earlydetection. The importance of fracture prevention as the main objective in the treatment of osteoporosis is further supported by the findings of Radominski et al[13], who emphasised the importance of early diagnosis and intervention. The notion of prevention is also substantiated in retrospective studies conducted by Chen *et al*. [17] and Kong *et al*. [5], who identified risk factors that, if identified early, can inform preventative measures and improve surgical outcomes.

Despite understanding the importance of preventative measures, a study by Bennell *et al* [7] revealed that traditional physiotherapy did not produce notable advances for individuals suffering from osteoarthritis of the hip whencompared to simulated treatment. This finding highlights the difficulty of formulating and implementing genuinely effective treatments for degenerative and joint diseases.

When examining the research carried out by Domb *et al* [9], it becomes clear that the use of cutting-edge techniques, especially those involving robotic assistance, can improve the results of arthroplasty procedures. This finding implies that the field of physiotherapy could benefit greatly from incorporating advanced technologies into its practices.

Totackleobstaclesinthefieldofphysiotherapy,itiscrucialtoadoptastrategy rooted in evidence [18]. They emphasise 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 [11].

In the field of post-operative management, rehabilitation is widely accepted as

standard practice. However, as emphasised by Madera et al [14], there is still a lack of substantial evidence to fully endorse its effectiveness. This emphasises the need for ongoing research and the establishment of treatment protocols firmly grounded in proven results.

Theimportanceofphysiotherapeuticexerciseisemphasisedbylolascoetal. [15] who stated that resistance training plays a crucial role in preserving bone health and improving muscle performance. Furthermore, Shah and Shinde [20] supported these findings by confirming the advantages of regular exercise in the treatment of arthritis.

The clinical applicability of exosome-based therapies, as mentioned by Wu *et al* [23], presented a promising frontier in the field of regenerative medicine. However, there are still challenges that need to be addressed in order to fully capitalise on their therapeutic potential.

The field of physiotherapy encounters significant obstacles in the treatment of degenerative and osteometabolic diseases. One of these challenges involves the need to validate the effectiveness of physiotherapy and integrate it with evidence-based practices. To overcome these obstacles, it is crucial to engage in ongoing clinical research and promote innovation in treatment methods. A study conducted by Huang *et al* [16] shed light on the progress made in the diagnosis and treatment of osteoarthritis, including the development of innovative therapies. Thisserves as a clear indication that physiotherapy is a constantly evolving field that must continually incorporate new discoveries to improve clinical practice.

To optimise patient recovery and therapeutic efficacy, physiotherapy must adopt a treatment model that incorporates collaboration with various healthcare professionals. In their study, Rezus *et al* [4] emphasised the importance of understanding the connection between chondrocyte activity and changes in the joint environment. Such an understanding has immense potential for advancing therapeutic strategies in the treatment of osteoarthritis. Quicke *et al* [22] proposed that treatment should be adapted to the specific needs and responses of each patient, emphasising the importance of individualisation. This is particularly relevant when considering the incidence and risk factors associated with diseases such as osteomalacia and scurvy.

Itisthereforecrucialthatpatientsunderstandtheintricateconnections between inflammation, chronic diseases and physiotherapy. This understanding

allows them to recognise the importance of adhering to the recommendations of healthcare professionals [10] The complexities involved in implementing physiotherapyforthesecondition snecessitateamulti-facetedapproach.Toincrease the effectiveness o f treatments, it is crucial to adopt evidence-based practices, integrate technology, conduct ongoing research, explore innovative therapies and adoptapersonalised,multidisciplinarytreatmentmodel.Bytacklingthesechallenges with well-informed strategies, physiotherapy has the potential to improve functionaloutcomes and patients' quality of life, whileat the same timecontributestothelong-termviabilityofhealthsystems [19].

CONCLUSION

Thisresearchhasshownthatphysiotherapyisessentialforimprovingthelives of patients with musculoskeletal issues. It aims to relieve pain, reduce inflammation and improve joint function, thus preventing future malignancies.

In conditions such as osteoporosis, observations show that physiotherapeutic devices help prevent falls and fractures, showing an impact ofpositive. In osteoarthritis, on the other hand, results can vary, indicating the need for personalised and multidisciplinary approaches.

With regard to post-surgical rehabilitation, we found that therapeutic exercises and practices such as Pilates are recommended for these patients. As such, physiotherapy is valuable in caring for patients with inflammatory and degenerative diseases.

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