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## PHYSIOTHERAPY'S ROLE IN OCCUPATIO- NAL HEALTH

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**Abstract:** Occupational physiotherapy is the area of physiotherapy that works to prevent, rescue and maintain workers' health. Through actions involving ergonomics, biomechanics, physical activity at work and recovery from complaints or physical discomfort at work. Over the years, the quality of life of workers has fallen sharply due to stress in the workplace, which causes physical and mental fatigue and it is extremely important that physiotherapists act on these disorders to help workers return to the workplace. This study aims to analyze the role of physiotherapists in workers' health through a literature review. This research is an integrative review of the literature on occupational health in the field of physiotherapy. After searching the databases, a total of 2,325 articles were found and, following the eligibility criteria, 07 articles were selected to form the basis of the review. The vast majority of articles reported that physiotherapy was effective in cumulative trauma disorders. It can therefore be concluded that physiotherapy, through its wide range of rehabilitation services, is essential and of great importance for returning to the workplace.

**Keywords:** Occupational health, Physiotherapy modalities, Cumulative trauma disorders.

## INTRODUCTION

Work-related musculoskeletal disorders (WMSDs) and repetitive strain injuries (RSIs) are musculoskeletal disorders that compromise the integrity of the articular, intra-articular, capsular and extra-articular structures of the human body. These pathologies are the result of inappropriate working postures, long working hours without proper breaks, repetition of the same task over a long period of time, heavy physical work with excessive loads, inadequate furniture and tools for work and countless other factors that are harmful to the physical and mental health of the worker (Lima; Maia, 2019).

Occupational physiotherapy is the area of physiotherapy that works to prevent, rescue and maintain workers' health. Through actions that involve: ergonomics, biomechanics, physical activity at work and the recovery of complaints or physical discomfort at work and the recovery of complaints or physical discomfort, with the aim of improving the quality of life of the worker, reducing absences caused by occupational diseases such as RSI and WMSD (Rodrigues, 2021).

In this way, physiotherapists increase the effectiveness of the prevention and treatment of musculoskeletal injuries, helping preventive services to carry out more individualized ergonomics for workstations and providing considerable advantages in the prognosis and recovery of injuries thanks to their direct therapeutic intervention (Prall; Ross, 2019).

For Duarte and Maia (2016), the activity of the physiotherapist in carrying out ergonomic analysis, guidance for adapting the work environment, recovery when necessary and even forensic technical assessment demonstrates the importance of the professional and their essentiality to the area. For them, the physiotherapist is the most suitable professional for the ergonomic, biomechanical and kinesiological interpretation of the pathologies installed during the working day; only these interpretations are capable of relating the pathology, the professional activity, the rehabilitation of the worker and the adaptation of the work environment.

Thus, the physiotherapist is the professional responsible for the assessment, prevention, treatment and reintegration of the individual into society and has unique knowledge of movement-related dysfunctions. And among the physiotherapy specialties, ergonomics and occupational health have been the choice of several professionals, reflected by an increase in the search for improvements in worker health and company productivity (Aparecida; Bertoncillo; Lima., 2018; Bernades; Junior, 2021; Maia., 2014).

Therefore, a survey of research on the subject is of great relevance to public health, and this data raises the need for professionals who work with patients. Despite being increasingly described in the literature in recent years, the subject remains the target of repercussions worthy of attention. It is the responsibility of the health services to take responsibility for their area of coverage. It is therefore necessary to investigate the role of physiotherapy in occupational health (Araújo; Ceolim; 2010; Irol-di, 2020).

It is important to awaken the interest of physiotherapy professionals in the subject in question, because it is up to the physiotherapist to promote health at the primary, secondary and/or tertiary care level, considering the biopsychosocial aspects of the patient, and can intervene in the return of quality of high-performance athletes in sport, performing techniques and methods aimed at promoting health. The aim of this study is to analyze the role of physiotherapists in occupational health through a literature review.

## LITERATURE REVIEW

### BIOMECHANICAL STRESS

Work occupies a significant part of human life, considering that most workers spend at least eight hours of their day in the workplace, for many years, carrying out various activities, some of which require the use of computer workstations, causing the user to assume a sitting posture for several hours, exposing themselves to the most diverse ergonomic risk factors that interfere with their well-being (Igas, 2018).

Job stress refers to the psychological caused by the imbalance between the target's needs and the individual's ability to adapt to specific working conditions (Xu *et al.*, 2021). Stress at work is one of the most important workplace health risks among employees worldwide

(Konstantinos *et al.*, 2008). One of the complications of modern life is the presence of stress in the workplace (Padman, 2015).

Work-related musculoskeletal disorders (WMSDs) are still a major concern in working life (Kok *et al.*, 2019). These disorders can, in addition to pain and suffering for the individual, cause economic consequences for the employer due to sick leave costs and reduced productivity.

Biomechanical risk factors include repetitive movements, carrying heavy objects and inappropriate body positions. Psychosocial risk factors include psychological distress, lack of support from others and lack of decision-making power. Social factors include culture, beliefs and cultural beliefs (Keyaets *et al.*, 2022).

And individual factors include lifestyle issues, age, gender, body mass index and living conditions (Tang *et al.*, 2017). Given the influence of multiple risk factors on the incidence of DME, the implementation of any prevention and control programs and measures requires the simultaneous identification and control of a set of risk factors (Svensson *et al.*, 2020).

## MUSCULOSKELETAL DISORDERS

Ultimately, research indicates that MSDS musculoskeletal disorders are chronic physiological problems that interfere with people's lives and adversely affect their daily activities, physical and mental health, family and social relationships and their work (Lim *et al.*, 2022). This finding extends to many job functions, and the problems often have a significant adverse impact on individuals' quality of life and affect all the physical and mental components of their lives.

Evidence suggests that sedentary workers are more prone to musculoskeletal health complaints (MHC) (Hanna *et al.*, 2019). Musculoskeletal health complaints MHC include

low back pain, upper back pain, neck pain, shoulder pain, arm pain and leg pain are the main causes of disability affecting 1.7 billion people worldwide (Cieza *et al.*, 2019).

Health professionals are at-risk populations due to their varied interventions that require significant loads (Vieira *et al.*, 2016). In this context, the practices of physiotherapists (PT) significantly expose them to musculoskeletal disorders MSDs, in fact, several risk factors have been identified inducing significant physical loads. Bending and twisting the trunk, transferring patients, performing manual therapy, working in maladjusted postures for long periods of time or repeating the same movements over and over again are all factors that contribute to and reinforce the presence of MSDs and associated symptoms (Muaidi; Shanb, 2016).

The economic burden of musculoskeletal injuries is well known, but due to their low mortality, health systems tend to underestimate them (Hoy D *et al.*; 2014). In developing countries such as Iran, most of the predisposing factors for MSDs are present, namely increased obesity and insufficient physical activity (Guthold R *et al.*; 2018). However, it is unclear whether the developing healthcare system has the potential to offset future burdens.

There are several underlying factors that contribute to the increased prevalence of musculoskeletal MSDs. MSDs are mainly considered irreversible conditions and become more common with advancing age (J. Devilliers H, Arnaud L; 2019). With population growth and increased life expectancy there would inevitably be an increase in MSDs.

To eliminate or minimize the risk factors for work-related musculoskeletal disorders (MSDs), primary prevention is widely advocated, and in 2017, a six-step framework was proposed for creating such prevention (Van Der Beek., 2017). The first three steps include identifying the incidence and severity of the

condition, determining the risk factors that may be involved and the mechanisms that can cause an MSD. In the fourth step, based on the knowledge from the previous steps, an intervention is developed. steps five and six concern the evaluation and implementation of the presumed effective intervention.

MSDs are partly preventable, given their association with work-related risk factors. With regard to physical ergonomic risk factors, such as forced exertion, demanding posture or repetitive movements, recent studies have found that occupational exposure is highly prevalent and there is evidence that the burden of MSDs attributed to this exposure is substantial (Hulshof *et al.*, 2021). For several prevalent musculoskeletal disorders, threshold limits are formulated for work-related risk factors. Examples are carpal tunnel syndrome, lateral epicondylitis, specific shoulder disorders, hip and knee osteoarthritis and lumbosacral radiculopathy syndrome (Descatha, 2016).

## OCCUPATIONAL DISEASES

In Brazil, questions about workers' health emerged from the 1980s onwards, where the aim was to understand the relationship between work and health-disease, which influenced the quality of life offered by this work, with a multidisciplinary and intersectoral approach (Minayo Gomez, 2018).

Occupational illness is defined as any biological or functional alteration (physical or mental) that occurs in an individual as a result of work. The work environment often presents risks that can compromise a worker's health. These can arise from dust, noise, heat, bacteria, chemicals and many other sources. There are also risks arising from the organization of work, which can cause musculoskeletal diseases such as back pain, or even RSI (repetitive strain injuries), and mental disorders (Brasil, 2018).

Problems such as health, safety, comfort and efficiency can be solved through ergonomics. In addition, it can be a tool to help prevent errors, thus contributing to better performance in production systems (Dutra, Laureano & Dutra, 2017). In order to minimize the costs of sick leave or retirement, many companies have adopted strategies to encourage physical activity in the workplace, thus helping to improve workers' quality of life (Santos *et al.*, 2020).

Workers' health encompasses complex issues involving illnesses, material and immaterial working conditions and the relationships between the various systems (health, welfare, family, etc.) relevant to workers. Therefore, the importance of programs, projects and intervention actions becomes indispensable for promoting workers' health and considering its impacts in the workplace (Neves *et al.*, 2018).

The most common occupational illnesses are musculoskeletal and mental illnesses, and these two groups of pathologies are the most responsible for sick leave. There are not many studies that quantify the costs of these illnesses, but it is estimated that 4% of the domestic product (GDP) of developed countries and 10% of the GDP of developing countries is spent on work-related illnesses (Laux *et al.*, 2016).

It can be said that, in the workplace, it is the responsibility of companies to invest in greater awareness of the benefits of an active lifestyle, so they can promote quality programs in the workplace so that employees at least have the chance to practice a little more physical activity on a daily basis (Machado-Junior *et al.*, 2012). In this context, workplace gymnastics (WG) is a strong ally in the fight against occupational diseases. Defined as a type of physical activity carried out in the occupational environment, its main purpose is to provide a space for improving the physical conditioning of workers (Santos *et al.*, 2020).



## ERGONOMICS AND PHYSIOTHERAPY

Historically, ergonomics and physiotherapy are intertwined, given the initial connection between the two. In Brazil, physiotherapy was recognized as a higher education profession in 1969 by Decree-Law 938\69, which defined it as a health science responsible for implementing methods and techniques with the aim of restoring, developing and conserving the patient's physical capacity (Barbosa; Marsal, 2016; Souza; Santos, 2016).

According to Itiro Lida (2016), ergonomics has changed the landscape of companies. Large companies, such as manufacturers of electronic devices, cell phones, household appliances and automobiles, are investing more in ergonomics. In Brazil, regulatory standards (NR-15-NR-17) have been introduced to maintain worker safety in the workplace, adapting equipment and machines according to the psychophysiological characteristics of workers.

Pinto (2018) states that ergonomics is defined by. Ergonomic practices favor the understanding of the activity, giving meaning to the work; they establish an interlocution between the actors involved at the different hierarchical levels, contribute to transformations and improvements in the sense of preserving the health and safety of workers, in the sense of preserving the health and safety of workers, as well as cooperating for a better performance of the organization.

Problems such as health, safety, comfort and efficiency can be solved through ergonomics. In addition, it can be a tool to help prevent errors, thus contributing to better performance in production systems (Dutra, Laureano & Dutra, 2017). In order to minimize the costs of sick leave or retirement, many companies have adopted strategies to encourage physical activity in the workplace, thus helping to improve workers' quality of life (Santos *et al.*, 2020).

Physical ergonomics deals with aspects such as correct posture, material handling, repetitive movements, RSI (repetitive strain injury), WMSD (work-related musculoskeletal disorders), etc. Cognitive ergonomics deals with mental processes: such as mental workload, stress, human-computer relationship, among others; while organizational ergonomics deals with aspects such as communications, group work and work projects (Gomes *et al.*, 2017).

In this context, the physiotherapist, proficient in these additional skills and operating within an integrated approach to health and well-being in the workplace (Sorensen *et al.*, 2018), can provide a holistic service from the initial employment. The role of physiotherapy in the Unified Health System (SUS) shows that there is room to expand the coverage and effectiveness of its actions, especially when it comes to services for workers (Santana; Barreto, 2013). In Brazil, one of the main causes of outpatient medical consultations is musculoskeletal complaints, influenced by work overload, which determine a large part of the demands on physiotherapy (Barbosa *et al.*, 2014).

During the Second World War, there was a great need for people specializing in the exercise treatment method, kinesiotherapy, in order to rehabilitate soldiers injured in combat. These people specialized in kinesiotherapy became the focus of the owners in their search for ways to prevent work-related morbidities. Soon the importance of the then occupational physiotherapist began to be attributed, since through kinesiotherapeutic, electrical, thermal and water resources, they made it possible to reduce production, since they prevented and recovered sick or injured workers. This gave rise to a set of rules and laws that dealt with the shape and environment of the workplace, what is now known as ergonomics (Barbosa; Marsal, 2016; Duarte; Maia, 2016).

It is known that physiotherapists are capable and able to act in various phases of pathological processes, which places them as the main agent in the prevention of repetitive strain injuries\work-related musculoskeletal disorders (RSI\WMSD) and their recovery if necessary (Ganança *et al.*, 2008; Sousa and Trindade, 2019).

Oliveira *et al.* (2016), when studying ergonomic education for workers, noted that the workers assessed showed greater theoretical knowledge and knowledge of the company's global ergonomics. They also observed that the workers who received ergonomic education considered the occupational ergonomist physiotherapist to be central to safe working hours, and considered him responsible for developing collective ergonomic awareness.

For Duarte and Maia (2016), the activity of the physiotherapist in carrying out ergonomic analysis, guidance for adapting the work environment, recovery when necessary and even forensic technical assessment demonstrates the importance of the professional and their essentiality to the area. For them, the physiotherapist is the most suitable professional for interpreting the ergonomics, biomechanics and kinesiology of the pathologies that arise during the working day, as only these interpretations are capable of relating the pathology, the professional activity, the rehabilitation of the worker and the adaptation of the work environment.

## **THE ROLE OF THE PHYSIOTHERAPIST**

Pandolpi, Vasconcelos and Almeida (2016), reporting on the experience of an RSI/WMSD prevention program, concluded by reflecting on the importance of the presence of physiotherapists and ergonomics at all levels of health care. They also state that the intervention of the occupational physiotherapist contributes to the reduction of complaints and muscu-

loskeletal diseases and indicated more commitment from company managers in order to install and raise awareness of ergonomics programs in their establishments.

When carrying out a field study, Rodrigues and Lima (2020) found that the application of active exercises before, during and after the working day resulted in a positive reduction in musculoskeletal complaints and an increase in performance and concentration at work. For them, physiotherapists are the professionals with the ergonomic skills to apply these exercises at work, as they have anatomical and kinetic functional knowledge of the human body.

In turn, Pinheiro (2016) states that despite the complex causes of work-related health disorders, they can be alleviated without harming the company, as long as there is greater engagement between the employer and the employee in adhering to the ergonomic projects introduced by the ergonomist physiotherapist. In his study, he concluded that physiotherapeutic intervention in the workplace promoted better working conditions, increased productivity and reduced the number of absences due to WMSDs. For him, physiotherapists play an extremely important role in workers' health, especially in the prevention of MSDs.

Souza and Trindade (2019) concluded that ergonomic management is capable of preventing numerous work-related pathologies. They also explained that the ergonomist physiotherapist is a highly qualified professional to carry out this role and should act as an applicator of ergonomic measures with the aim of preventing and recovering problems caused by the practice of work.

## GYMNASTICS

According to Bezerra *et al.* (2015), occupational gymnastics is one of the most used resources in workers' health. It can be performed collectively and during the working day, consisting of a light and short physical activity. It is a program prepared according to the function performed by the worker, with the main objective of reducing occupational injuries, preventing muscle fatigue, reducing painful symptoms in the spine region and correcting postural vices.

Basically, there are three types of gymnastics at work, established according to the objectives and the time at which they are applied in the company: Preparatory or warm-up GL, carried out at the start of the working day or in the first few hours of work, with the main objective of preparing employees to carry out their daily activities by warming up the muscle groups that they will use the most, compensatory or break GL, practiced during the working day through breaks to perform specific exercises to compensate for repetitive efforts, posture and structures that may be overloaded; and relaxation or end-of-work-day GL, where stretching and muscle relaxation exercises are performed with the aim of oxygenating the muscle structures to reduce fatigue and leave the tiredness at the end of the working day (BRANCO, 2015).

## METHODOLOGY

### TYPE OF RESEARCH

This research is an integrative literature review on occupational health in the field of physiotherapy, highlighting the concept, the most relevant characteristics, the main injuries and the means of physiotherapy rehabilitation to promote recovery and return to work activities, which provides a greater understanding of the topic of interest, as well as combining data from the literature.

The integrative literature review is also one of the research methods used to incorporate evidence into clinical practice. The purpose of this method is to gather and synthesize research results on a specific topic or issue in a systematic and orderly manner, contributing to a deeper understanding of the subject under investigation. The literature review is an integrative study, because it manages to provide a broad knowledge of current issues and guarantees beneficial repercussions of research outcomes (Botelho; Cunha; Macedo, 2011).

### STUDY POPULATION

In order for the guiding question to be developed, the domains of the acronym PICO (Population/patients; Intervention; Comparison/control; Outcome/outcome) were used, considering terms that are carefully defined as context. The bibliographic survey was carried out between March and May 2024 in the following databases: *Medical Literature Analysis and Retrieval System online* (MEDLINE via Pubmed), Latin American Health Sciences Literature (LILACS) via the Virtual Health Library and *Physiotherapy Evidence Database* (PEDro). This literature review was conducted in 6 stages of investigation following the protocol established by Botelho; Cunha; Macedo (2011).

### INCLUSION CRITERIA

The following study included primary studies referring to case reports, case studies and case-control studies, case detection ("screening"), cutoff studies, randomized clinical trials and consensus published in the last 5 years, freely accessible, by electronic means, corresponding to the search terms written in English or Portuguese and covering aspects related to physiotherapy in workers' health.



## EXCLUSION CRITERIA

All duplicate articles, research published in years prior to 2019, texts from theses, dissertations and journals, articles in the form of editorials, letters to the editor, books, or abstracts published in event proceedings, as well as those that deviate from the proposed theme, were excluded.

## COLLECTION PROCEDURE

In order to obtain better results, the PICO strategy was applied, in order to determine the research question, enabling a more significant search for information to compose the evidence of the study, and consequently answering more clearly and concisely the questions pertinent to the theme (Mendes; Silveira; Galvão, 2019). To select the controlled descriptors (Occupational Health, Physical Therapy Modalities, Cumulative Trauma Disorders) and non-controlled descriptors (Occupational Health, Physical Therapy Modalities, Cumulative Trauma Disorders), the terms in the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH) were consulted (Chart 1).

## DATA ANALYSIS

The process of investigating articles was carried out by a researcher, who is a graduate student on the Physiotherapy course at the Piauí Higher Education College (FAESPI), using a search strategy obtained through terms previously listed on PICO. Based on these procedures, the data resulting from the research was presented in table format, showing the author of the article, year of publication, title of the journal, type of study, objectives, methodology process and conclusive results of the study.

## ETHICAL ASPECTS

As this is an integrative review, it was not necessary to submit the work to an evaluation by the Research Ethics Committee, in accordance with Resolution 466/12 of the National Health Council (CNS). During the research, the author adhered to ethical principles, ensuring the authenticity of the study developed, without plagiarizing the studies analyzed to obtain data for the research or any other work previously published.

## RESULTS AND DISCUSSION

By combining the descriptors DESC/MESH using the Boolean operators OR and AND, 479 articles were found and 110 articles were excluded because they were duplicated in more than one database. After this stage, based on the exclusion and eligibility criteria, 300 were eliminated because they did not correspond to the proposed theme, so 14 articles were selected for the eligibility criterion, then the readings were carried out and 08 articles were chosen to make up the review base. The process of searching and selecting articles is represented by the flowchart in figure 01.

Table 01 below shows the distribution of the main articles selected in this review, with their author\ano, objective, methodology and results.

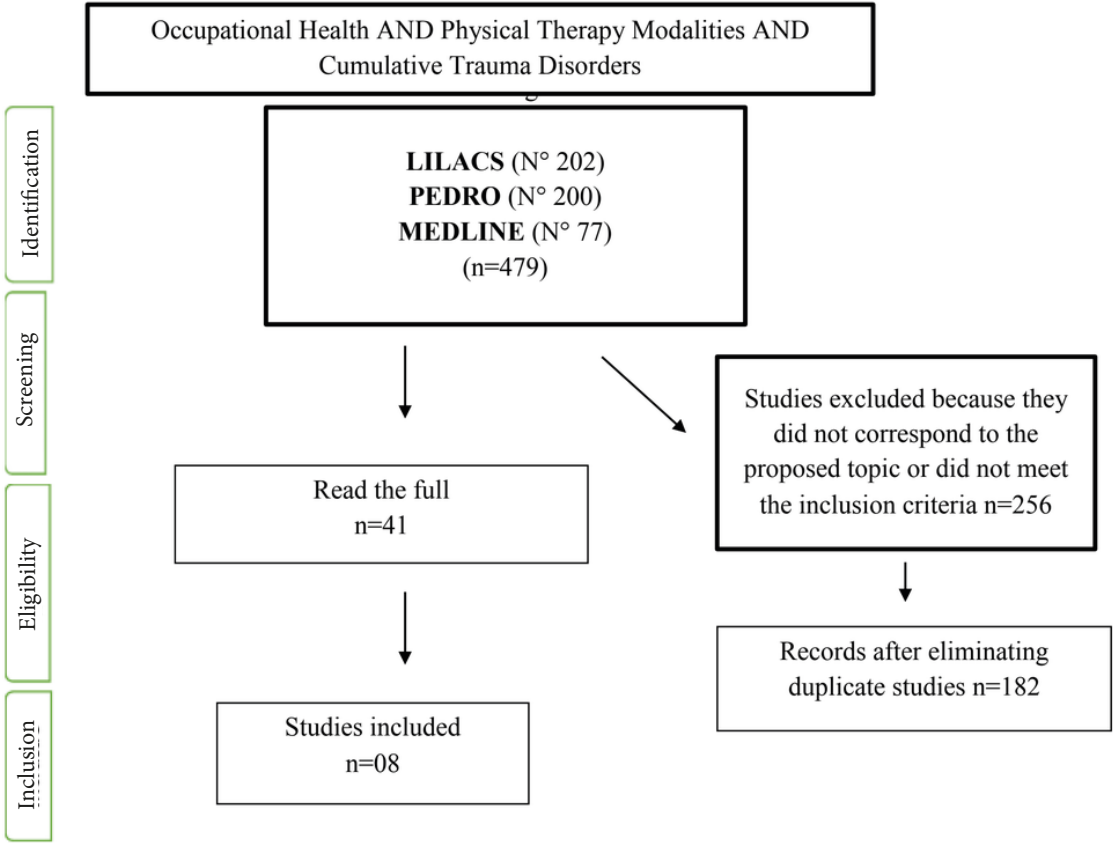
Future studies should continue to explore and validate these interventions, always seeking to optimize physiotherapeutic practices in the occupational context.

The study by Nascimento, Cunha and Soares (2019) evaluated 21 employees in the administrative sector of a hospital, 10 of whom were female and 11 male, with an age range between 21 and 53 years, with average age of approximately  $35.8 \pm 10$  years. The compensatory kinesiotherapy sessions were carried out three times a week, lasting between 10 and 15 minutes over seven weeks, totaling 24 meetings, of which 2 were for initial data collection,

DECS		
Controlled descriptor		Uncontrolled descriptor
P	Occupational Health	Occupational Hygiene; Workers' Health; Employees' Health; Workers' Health; Occupational Safety; Workers' Safety; Safety at Work; Occupational Safety.
I	Types of Physiotherapy	Physiotherapy, Physiotherapy (Techniques), Group Physiotherapy, Group Physiotherapy, Group Physiotherapies Physiotherapy Techniques; Physiotherapy Techniques.
Co	Cumulative Trauma Disorders	WMSD; Work-Related Musculoskeletal Disorder; Work-Related Musculoskeletal Disorders; RSI; RSI-WMSD; Repetitive Strain Injury; Repetitive Strain Injury; Overuse Syndrome; Repetitive Strain Injury.
MESH		
P	Occupational Health	Health, Occupational; Industrial Hygiene; Safety; Occupational; Occupational Safety; Employee Health; Health, Employee.
I	Physical Therapy Modalities	Modalities, Physical Therapy; Modality, Physical Therapy; Physical Therapy Modality; Physiotherapy (Techniques); Physiotherapies (Techniques); Physical Therapy Techniques; Physical Therapy Technique; Techniques, Physical Therapy; Group Physiotherapy; Group Physiotherapies; Physiotherapies, Group; Physiotherapy, Group; Physical Therapy; Physical Therapies; Therapy, Physical.
Co	Cumulative Trauma Disorders	Cumulative Trauma Disorder; Trauma Disorder, Cumulative Injury; Repetition Strain; Repetition Strain Injuries; Strain Injury, Repetition; Overuse Injury; Trauma Disorders, Cumulative; Repetitive Motion Disorders; Motion Disorder, Repetitive; Repetitive Motion Disorder; Repetitive Strain Injury; Overuse Syndrome; Repetitive Stress Injury; Repetitive Stress Injuries; Stress Injury, Repetitive; Repetition Strain Injury

**Chart 1** - Controlled and non-controlled descriptors used to build the search strategy. Teresina, Piauí, Brazil, 2024.

Source: Author, 2024.



**Figure 01:** Flowchart of the search and selection stages for the articles analyzed.  
Source: Research author (2024)

Author (s)Year	Objective	Methodology	Results
Nascimento; Cunha and Soares (2019)	To evaluate the benefits of occupational kinesiotherapy in 21 employees from the administrative sector through an intervention program of occupational exercises.	The sessions were carried out three times a week, always in the morning, using compensatory kinesiotherapy lasting 10 to 15 minutes, totaling 24 meetings, 2 for initial data collection and 2 for reassessment in the final data collection of 20 for intervention.	According to this study, it has been proven that a work kinesiotherapy program, when applied properly, can only make a satisfactory contribution to both the employees and the company.
Hutting et al. (2020)	The aim of this study is to improve the effectiveness of physiotherapy (in primary health care) with regard to the work participation of employees with (DMES), musculoskeletal disorders by increasing the knowledge and skills of generalist physiotherapists and improving collaboration between generalist physiotherapists and physiotherapists specializing in occupational health.	This trial is an unblinded two-arm cluster randomized controlled trial. Working patients with MSDs who visit a physiotherapy clinic are the target group. The control group will receive normal physiotherapy treatment and the intervention group will receive treatment from a physiotherapist with more knowledge about work-related factors.	It is hoped that the test will result in a more effective physiotherapy process for working MSDS patients. This will lead to a substantial reduction in costs. Lower costs thanks to a more effective physiotherapy process and lower costs due to fewer or shorter periods of sick leave and reduced presenteeism.
Duarte, Lima (2020)	To evaluate the physical and mental state of the employees according to a questionnaire, before and after gymnastics exercises, as well as to raise awareness among the workers through lectures on ergonomics and the importance of gymnastics in preventing these diseases.	The research method used an adapted questionnaire, in which the workers were assessed according to their physical and mental state, the work environment, their willingness to work and their job satisfaction before and after gymnastics in the prevention of occupational diseases.	The research method used an adapted questionnaire, in which the workers were assessed according to their physical and mental state, the work environment, their willingness to work and their job satisfaction before and after gymnastics in the prevention of occupational diseases.
Rodrigues, Lima (2020)	Evaluate the ergonomic performance of physiotherapists and the effects of occupational gymnastics in the face of complaints of pain, discomfort and changes in the mood of the nursing team at work.	The research was carried out in a private hospital in the northwest of Minas Gerais. Technicians and nurses working in the same role took part in the research, and 8 female participants aged between 18 and 60 who signed a consent form took part in the research.	At the end of the occupational gymnastics program, there was a significant reduction in the percentage of musculoskeletal complaints, thus demonstrating the benefits of the ergonomic work of physiotherapists implementing occupational gymnastics in companies.
Rabadan et al. (2020)	To evaluate the effectiveness of a multimodal physiotherapy intervention in relieving musculoskeletal pain in office workers.	A longitudinal pre-post study was carried out during the months of March, April and May 2018 in a population made up of office workers from the University of San Jorge (Zaragoza, Spain).	The results indicate that a multimodal physiotherapy program can relieve work-related musculoskeletal pain in office workers and serve as a basis for future controlled trials.
Johnston et al. (2021)	To assess the impact of an ergonomic and physical training intervention and an ergonomic and health promotion intervention on the intensity of neck pain at the start of the study.	A 12-month cluster-randomized clinical trial was conducted in 14 public and private organizations office workers aged >18 years, working >30 hours per week (n=740) received an individualized ergonomic intervention at the workstation.	The (EET) ergonomic and physical training intervention was more effective than the (EHP) ergonomic and health promotion intervention in reducing neck pain intensity in all workers and neck cases immediately after the intervention period (12 weeks) but not at 12 months, with changes at 12 weeks reaching clinically significant thresholds for neck cases.

Matifat et al. (2023)	To compare the effectiveness of an advanced practice physiotherapist-led (APPT) model of care with usual emergency medical care for people presenting with a minor musculoskeletal disorder (MSKD), in terms of patient-related outcomes, healthcare resource utilization and healthcare costs.	This study is a multicenter randomized controlled trial (RCT) with cost analysis. Six Canadian DES (clusters) will be randomized to a treatment sequence where patients will be managed by an APPT ED or receive usual ED medical care. Seven hundred and forty-four adults with minor MSKD will be recruited.	MSKD have a significant impact on healthcare systems. By providing innovative and efficient pathways to access care, APP's care models can help relieve pressure on emergency services, while providing efficient care for adults with MSKD.
Laach and Cygańska (2024)	The aim of the study was to evaluate the effectiveness of an exercise protocol for preventing hand and wrist pain in office workers.	The study group consisted of 62 office workers who reported complaints of hand and wrist pain. The exercise group consisted of 49 subjects who performed the exercise protocol and the non-exercise group consisted of 13 subjects.	The results of the study indicate that the regular performance of a preventive exercise program has an effect on increasing forearm muscle strength in a group of office workers.

**Chart 01** - Synoptic distribution of studies in terms of author/year, objective, methodology and main results.

**Source:** Authors (2024)

2 for reassessment in the final data collection and 20 for the intervention.

After analysis, the authors Nascimento, Cunha and Soares (2019) found a significant improvement in hamstring flexibility (P=0.001), so the results indicate that occupational kinesiotherapy benefited the volunteers by reducing the intensity of pain in the lower back and knee, as verified by the visual analog scale and the body diagram during the intervention period. Descriptive analysis revealed a reduction in pain symptoms in all body segments. The exercises were focused on work practice, prioritizing the body segments most overloaded during the working day, such as the lumbar spine and lower limbs. As a result, it was possible to see a significant reduction in pain in these areas. In addition, it is important to highlight the 20% increase in the number of individuals who reported no pain after applying the exercise protocol.

These findings corroborate the study by Freitas *et al.* (2011), which sought to verify the effects of kinesiotherapy on employees with occupational low back pain who worked in a sitting position. 38 subjects took part in 10 sessions lasting 10 minutes, twice a week. The results suggest that occupational kinesiotherapy improved low back pain by reducing its

intensity, improving the functional capacity of the trunk stabilizer muscles and joint range of motion.

According to the study by Moretto; Chesani; Grillo (2017), they observed that regions of the neck, upper limbs, dorsal spine and lumbar spine are more prevalent in terms of pain and discomfort caused by repetitive strain. The lack of strengthening and recovery of a muscle subjected to daily stress brings with it a series of factors that can lead to future illnesses. In this context, an attempt was made to assess musculoskeletal symptoms and quality of life in seamstresses, where it was found that 70% felt pain in some area of the body, causing physical and psychological discomfort. In view of the results, it was recommended that a set of preventive measures be taken in the workplace, such as micro breaks, postural corrections and occupational gymnastics.

In the research by Hutting *et al.* (2020) an interview was conducted with 67 physiotherapists and Postural Exercise Therapists working in the Netherlands. 64% of the 142 respondents indicated that occupational factors should be addressed to a greater extent within physiotherapy. Only 14.8% of respondents indicated that they communicate with or consult a physiotherapist specializing in oc-

cupational health. Only 12.7% of respondents who do not have a specialized physiotherapist in their practice sometimes\regularly refer patients to a specialized physiotherapist. The participating physiotherapists stated that, when communicating with or consulting other occupational health professionals, they mainly have contact with occupational physicians\covenants (72.5%) and occupational therapists (31.7%).

This same study shows that the patient must actively participate in the care process and must take responsibility for the care process and have a positive way of dealing with adversity. This is different from providing patient education, which usually involves providing information relevant to a specific complaint, providing specific information related to the condition and drawing up specific contingency plans.

Duarte and Lima (2020) investigated the causes of occupational illnesses affecting administrative workers and assessed the effectiveness of gymnastics in preventing these illnesses. Ten employees took part in this study, of both sexes, aged between thirty and fifty-one. An adapted questionnaire was used as the research method, in which the workers were assessed according to their physical and mental state, the work environment, their willingness to work and their job satisfaction before and after gymnastics.

Preparatory gymnastics exercises were applied five times a week, from Monday to Friday, at the beginning of the morning shift, at 8am, lasting between 10 and 15 minutes, for a total of 67 days. The results showed a slight improvement in pain due to work and more willingness to work after the application of Occupational Gymnastics. Duarte and Lima (2020).

Workers who use computers, with a poorly adapted work environment or inadequate ergonomic condition of the work environment or inadequate ergonomic condition of the computer are subject to back pain, neck pain, upper limb pain and vision problems. Occupational gymnastics helps to promote workers' health, providing individual changes and improving quality of life by reducing pain in different body regions (Benelli; Costa, 2017).

Rodrigues and Lima (2020) evaluated the ergonomic work of physiotherapists and the effects of occupational gymnastics on complaints of pain, discomfort and changes in the mood of nursing staff during work. The research was carried out in a private hospital in the northwest of Minas Gerais. Eight female participants aged between 18 and 60 who signed a consent form took part in study.

For data collection, the adapted Nordic Osteomuscular Symptoms questionnaire was applied before and after the intervention. At the end of the occupational gymnastics program, there was a significant reduction the percentage of musculoskeletal complaints, thus demonstrating the benefits of the ergonomic work of physiotherapists implementing occupational gymnastics in companies.

Corroborating Sousa *et al.* (2016), who emphasize that in the provision of direct patient care, musculoskeletal disorders are related to the work activities of the nursing team, such as repositioning the patient in bed, bathing, changing clothes, transferring from the bed to the shower chair, In cases where the patient has reduced mobility and is totally dependent on the professional, without the proper ergonomic knowledge and care, the professional carries out these activities in a repetitive, tiring way that requires intense physical strength, without worrying about whether they are being carried out correctly, aiming only to speed up their work and in the shortest possible time.



According to Magalhães *et al.* (2021) as part of a project called “Rehabilitating those who care” developed by the authors in a hospital center in northern Portugal, it was pointed out that it is essential to adapt preventive intervention to the needs of those involved, especially in teams from different institutions. In other words, it’s not just a matter of doing for the sake of doing, it’s necessary to develop an occupational gymnastics program that meets the specific needs of the public to be served in order to achieve the desired results. In addition to seeing an improvement in satisfaction and well-being at work, it was also noted that there was an increase in awareness of the importance of using suitable equipment to ensure an ergonomic posture during professional activities.

Musculoskeletal disorders among nursing staff are a recognized contributing factor to reduced quality of care, reduced job satisfaction, reduced quality of life, career change and early retirement (Lipicomb *et al.*, 2004; Collins and Menzel, 2006). It is considered that muscle strength in body regions frequently recruited by work activities can improve the body’s physical and physiological responses to counteract external loads (Hamberg-van *et al.*, 2006).

These data diverge from the study by Johnston *et al.* (2021), which evaluated the immediate (after 12 weeks of intervention) and long-term (12-month follow-up) effects of a combined exercise and ergonomic intervention on neck pain in a general population of office workers and among office workers who were symptomatic at the start of the study. Employees were recruited from 14 public (n = 9) and private (n = 5) metropolitan organizations in Australia. Eligible participants were office workers aged ≥18 years, working ≥30 h/week.

After analysis, it was found that the combined exercise and ergonomics intervention was more effective than a combined health promotion and ergonomics intervention in reducing the intensity of neck pain in all workers and those with neck pain immediately after the intervention period. However, intervention differences were not maintained at the 12-month follow-up, suggesting the potential need for exercise interventions to be long-term or continuous to maintain benefits (Johnston *et al.*, 2021).

Public health determines that active office workers generate considerable risk, specifically with regard to musculoskeletal injuries (Arslan *et al.*, 2019). It is therefore suggested that companies invest in promoting health and wellness activities related to physical exercise that workers can carry out during their working day (Silva *et al.*, 2014).

On the other hand, Coté *et al.* (2009) found improvements in cervical symptoms, but adjustments to workstations were not sufficient for this purpose and it was necessary to include additional treatments, such as improving physical fitness. Thus, it is possible that better results will be achieved if ergonomic intervention is complemented with an improvement in workers’ physical capacity. However, it is possible that a combination of the most common interventions, exercise and ergonomics, will bring benefits to the office worker with neck pain than either alone, which is what happened in the last six one-month randomized studies that found the combination of exercise and ergonomic modifications and exercise alone were effective in reducing the severity of neck pain in symptomatic office workers at the beginning of the study compared to a control group (Sharial *et al.*, 2018).

The Australian study by Pereira *et al.* (2019), compared two 12-week intervention programs, with participants who took part in a workplace ergonomics intervention and

a workplace ergonomics intervention and a neck exercise program showing lower health-related work productivity loss at 12-month follow-up than those who took part in a workplace ergonomics and health promotion program.

In the research carried out by Matifat *et al.* (2023), the effectiveness of a treatment model led by an advanced practice physiotherapist was compared with the usual treatment by emergency room doctors for people presenting with a mild musculoskeletal disorder. This multicenter stepped wedge randomized controlled trial with a cost analysis.

Although opioids should not be the first-line treatment for the management of musculoskeletal disorders. They represent a significant part of the current medical treatment of pain. On the other hand, recommended non-pharmacological approaches, such as physiotherapy, are little used. Studies involving Physical Therapists as primary care providers for patients with musculoskeletal disorder have shown that early access to care takes more time with patients and can provide more thorough patient education and offer strategies for autonomy (Baker *et al.*, 2019).

Physiotherapists are expert clinicians with advanced knowledge in pain management. Therefore, their role as first-contact healthcare professionals is relevant and could improve access to emergency services (Femelly *et al.*; 2020). Effective management of musculoskeletal disorder by physiotherapists has been shown to reduce medical caseloads (McDonough *et al.*, 2022).

In the study by Laach and Cygańska (2024), 62 office workers with complaints of hand and wrist pain were assessed. The exercise group consisted of 49 individuals who performed the exercise protocol and the non-exercise group consisted of 13 individuals. An exercise program, consisting of 7 exercises. The program was designed for a daily routine over 8 weeks.

The effectiveness of the exercise program was assessed by physical parameters (handgrip and pinch strength, forearm muscle strength) and questionnaires (Visual Analog Pain Scale, Carpal Tunnel Syndrome Symptom Severity Scale and Carpal Tunnel Syndrome Functional Status Scale hand functional assessment questionnaires) were carried out. The assessment was carried out before and after the intervention.

Statistical analysis of the data showed significant changes in the handgrip value measured for the right hand ( $Z = -2.85$ ,  $p < 0.01$ ). For the pincer grip, the changes were significant for both the right hand ( $Z = -2.12$ ,  $p < 0.05$ ) and the left hand ( $Z = -2.35$ ,  $p < 0.05$ ). Functional performance improved significantly in the compared groups. There was no statistically significant change in the intensity of the pain felt.

Among the various forms of therapeutic improvement for patients with mild to moderate CTS, physiotherapy is the most widely used method. Among the treatments used are ultrasound, electrotherapy, laser therapy and magnetotherapy, as well as kinesiotherapy, which involves treatment with movement (Golabek; Majcher, 2018). According to Wilk (2015), the most effective exercises are those aimed at stretching and neuromobilizing the median nerve.

These findings corroborate the study by Fernandes (2015), who found that the group that used manual physiotherapy obtained significantly higher results in terms of self-reported function and handgrip strength at the one-month follow-up, similar to a previous study which found that physiotherapy consisting of manual therapies, including central nervous system desensitization manoeuvres was equally effective at 6 and 12 months as surgery in improving self-reported pain function in women with CTS.

It can therefore be concluded that the inclusion of physiotherapy programs in companies and awareness of their importance are essential for promoting a healthier and more productive work environment. Future studies should continue to explore and validate these interventions, always seeking to optimize physiotherapeutic practices in the occupational context.

## FINAL CONSIDERATIONS

The studies analyzed showed that physiotherapy interventions, such as occupational kinesiotherapy, stretching programs, ergonomics and postural education, can significantly reduce the incidence of work-related pain and discomfort, as well as improving workers' flexibility, strength and general well-being. Physiotherapy focused on the prevention and treatment of musculoskeletal dysfunctions has proved to be crucial in reducing sick leave and improving workers' quality of life.

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