



# Musculoskeletal Disorders in the Workplace of Physiotherapists: Occupational Risk Factors and Their Role in Prevention and Management: A Systematic Review

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## Abstract

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**BACKGROUND:** Since musculoskeletal disorders at work (MSDW) are very common among physiotherapists, we must introduce strategies that could help reduce their prevalence. The main objective of this study was to determine the prevalence of MSDW among physiotherapists, which parts of the body are most often affected, what are the ergonomic risk factors for MSDW among physiotherapists and what are strategies to reduce them.

**METHODS:** In the systematic literature review, involving a total of 2127 physiotherapists, search terms such as occupational musculoskeletal disorders, physiotherapists, and occupational risk factors were used in the SCOPUS (n = 24), MEDLINE (n = 2), ScienceDirect (n = 103), PEDro (n = 0), Cumulative index of the nursing and allied health literature (n = 3), and PubMed (n = 30) databases in February 2024. The search included only original studies published in English, cross-sectional studies published in the past 10 years, studies that included the prevalence of MSDW, and studies that included risk factors for MSDW. In the end, we included eight studies in the systematic review.

**RESULTS:** A systematic review of eight studies highlighted the prevalence and risk factors associated with MSDW among physiotherapists. The studies were conducted on samples ranging in size from 75 to 501 individuals and focused on determining the prevalence of MSDW and identifying the associated risk factors. The prevalence rates differ, with the lower back region being the most affected region in all studies (38–68.8%), followed by the neck (10–59.2%) and the shoulder girdle (7–51.7%). Risk factors included back strain, awkward posture, prolonged posture, frequent bending/turning of the trunk, performing manual therapy techniques, patient lifting, repetitive tasks, work environment, and psychosocial issues. Reported coping strategies included changing one's working posture, improving one's body mechanics, and taking more breaks during the workday.

**CONCLUSION:** Our systematic review of the literature revealed a high prevalence of MSDW among physical therapists (up to 92%) and highlighted the urgent need for strategies to mitigate this widespread problem. These findings highlight the multifaceted nature of the etiology of MSDW and point to the interplay of physical demands, ergonomic challenges, and psychological stressors that characterize the profession of a physical therapist.

## Introduction

Musculoskeletal disorders at work (MSDW) are the main cause of absence from work and impose significant costs on the public health system. A specific MSDW can affect different parts of the body [1], and it is one of the most common occupational conditions [2]. MSDW also causes an economic burden as they lead to disability, absenteeism, and reduced productivity [2]. Despite physiotherapists' extensive knowledge of the human body and its movement needs [3], and their knowledge of musculoskeletal disorders and various prevention strategies, they are at high risk of developing MSDW [4], [5]. Jacquier-Bret and Gorce [6], in a systematic review including 36 studies covering six health professions, reported a 55% prevalence of MSDW in physiotherapists, but with a wide range. For all health professions, the neck and lower back were the most exposed areas with a high average prevalence. For physiotherapists, the mean prevalence was 32.0%

for the neck and 36.5% for the lower back. Milhem *et al.* [7] reported that the lifetime prevalence of MSDW in physiotherapists ranged from 55% to 91%, and the 12-month prevalence ranged from 40% to 91.3%. The lower back was the most affected, with estimates of lifetime prevalence ranging from 26% to 79.6% and of 12-month prevalence ranging from 22% to 73.1%. This was followed by the neck, upper back, and shoulders. According to a systematic review by Vieira *et al.* [8], between 53 and 91% of physiotherapists experienced MSDW at some point during their working lives. The lower back was also the body part most frequently affected.

Gorce and Jacquier-Bret [9] also reported a relatively high prevalence of MSDW in physiotherapists, regardless of specialty, with rates above 50%. In this systematic review, the lower back was also the area with the greatest prevalence of MSDW, at a rate of  $41.7 \pm 19.3\%$ , followed by the neck ( $36.2 \pm 23.8\%$ ) and thumb ( $38.0 \pm 40.0\%$ ). More specific studies have been conducted on work-related diseases of the

thumb [10], [11], [12], wrists and hands [13], upper limbs [14], [15], pain in the lumbosacral spine and cervical spine [16], and pain in the lower back [17], [18], and [19]. There are a few studies that include strategies to reduce body strain [20], [21], [22], and [23]. The most commonly used preventive strategies include improving body mechanics, increasing patient responsibility for treatment, avoiding lifting, frequently changing working postures [22], modifying the posture of physiotherapists or patients [20], [21], and [23], adjusting bed height before treating patients [20], [21], and [23], and seeking help from a physiotherapist [23]. The field of health care involves ergonomic risks related to physical and mental strain at work. Various studies have reported the physical strain on health workers, which is mostly due to risk factors such as working in the same posture for a long period of time, working in an awkward/cramped posture, treating a large number of patients in 1 day, performing the same task repeatedly [6], [24], and working when physically fatigued/injured [6].

Gorce and Jacquier-Bret [9] concluded from a systematic review on MSDW that the most common risk factors among physiotherapists are bending and twisting forward; lifting or carrying a dependent patient; working in the same posture for a long period of time; performing the same task repeatedly; and performing manual therapy. Manual therapy was also found to be a risk factor for MSDW by Cornwell *et al.* [25]. A few studies highlighted the importance of early intervention and ergonomic measures to reduce the prevalence of MSDW among physiotherapists. MSDW affect physical therapists with loss of health status and social costs, therefore is a relevant problem [11]. There are many risk factors for MSDW and few studies in the field of physiotherapy, so we aimed to fill this research gap with this study. The purpose of the survey was to investigate the prevalence of MSDW among physiotherapists, the most affected body parts, risk factors and the most common ergonomic strategies that physiotherapists use to reduce MSDW.

## Methods

This systematic review of the literature was conducted in accordance with the preferred reporting items for systematic review and meta-analysis (PRISMA) guidelines [26]. Six databases, including SCOPUS, MEDLINE, ScienceDirect, PEDro, cumulative index of the nursing and allied health literature (CINAHL), and PubMed, were searched from February 1 to February 20, 2024. The keywords used for the search at all 6-time points were MSDW, physiotherapists, and occupational risk factors. When the keywords were entered into a comprehensive database of scientific literature and research resources, SCOPUS showed us 24 hits, and the

MEDLINE bibliographic database gave us two hits. The comprehensive scientific literature database ScienceDirect showed 103 hits. The PEDro database gave us no hits. The CINAHL database showed three hits, and the National Library of Medicine PubMed showed 30 hits.

The inclusion criteria were as follows: (1) original studies published in the English language, (2) cross-sectional studies published in the past 10 years, (3) studies that included the prevalence of MSDW, and (4) studies that included risk factors for MSDW. First, duplicate studies were excluded. Afterward one of the researchers (PK) excluded conference abstracts and protocol articles, screened the study titles from the search results against the inclusion and exclusion criteria, and removed studies that were not relevant to the review. The second researcher (NK) then screened the remaining studies by reading the abstracts of each study to determine whether they should be included in the review. In addition, studies that included review articles, that examined other health professions and patients involved in rehabilitation or physiotherapy treatment, that included only a specific part of the body, or that included studies with non-relevant outcomes were excluded from this review. For the included studies, the authors (NK and PK) collected relevant information, including the objective, prevalence, outcome, and results. In case of disagreements about the texts used, the authors discussed and consulted each other.

## Results

### *Selection of articles for review*

According to the PRISMA guidelines, a total of 162 articles (SCOPUS–24, MEDLINE–2, ScienceDirect – 103, PEDro – 0, CINAHL – 3, and PubMed – 30) were found. Nine duplicates were removed right away, leaving 153 articles. After the initial screening, 129 articles were excluded because they did not address our topic in headlines or in abstracts. Subsequently, the remaining 24 studies were screened according to our inclusion and exclusion criteria. Thus, articles were excluded because they were review articles ( $n = 4$ ), did not include a population of physiotherapists (the article did not address this population) ( $n = 2$ ), researched only a specific part of the body ( $n = 7$ ), or its outcomes were not relevant to our study ( $n = 3$ ). The remaining eight articles were critically appraised and included in our systematic review (Figure 1). The participants were from India, Greece, Egypt, Kuwait, Saudi Arabia, Malaysia, and Vietnam.

### *Background of selected articles*

Table 1 presents the findings of the first study on MSDW conducted among 100 Indian

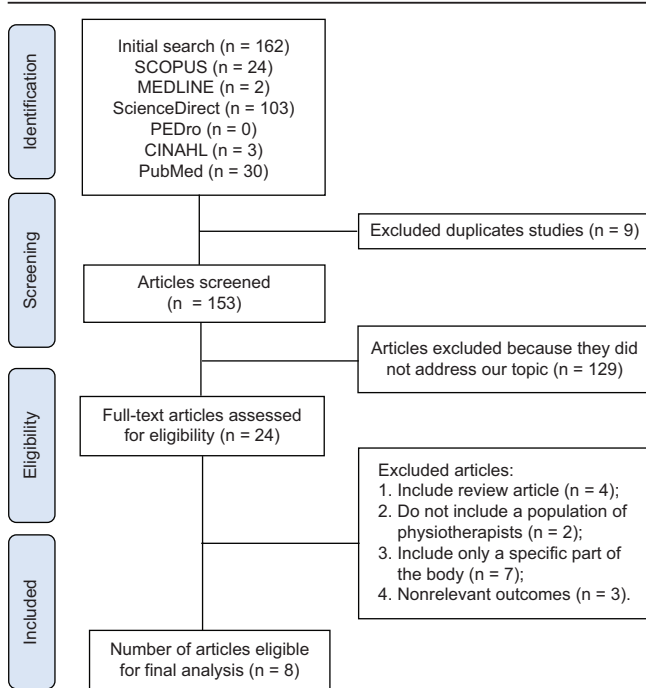


Figure 1: Flow diagram of the search process

physiotherapists by Iqbal and Alghadir [27], with a 75% response rate. The results indicate a high prevalence of MSDW, with 92% reporting musculoskeletal pain since entering the profession and 32% experiencing pain, mainly in the lower back (51%), at the time of the survey. Gender differences were observed in the location and duration of pain: Men experienced discomfort in the lower back, neck, and shoulders, while women reported a longer duration of pain in the hands and knees. Sports physiotherapists were identified as particularly susceptible to MSDW, suggesting that their occupational activities contribute significantly to MSDW. Physiotherapists can reduce the risk of MSDW through physical therapy, improved working posture, and the use of ergonomically designed workstations. Anyfantis and Biska [28] conducted a survey among Greek physiotherapists that revealed a high prevalence of MSDW injuries, particularly in the lower back, upper back, shoulders, and neck. Experienced physiotherapists showed lower injury rates, probably due to better adherence to practices and use of equipment. Challenges such as limited workspace and heavy equipment contribute to injuries, although many physiotherapists continue to work despite reporting injuries. Physical therapy sessions and ergonomic adjustments are commonly used strategies to mitigate the risks of MSDW, underscoring the importance of improving workplace conditions for physiotherapists' well-being.

Khairy *et al.* [29] studied the prevalence of MSDW, and the causes and risk factors among Egyptian physiotherapists, achieving a response rate of 88.9%. In contrast to other studies, this study revealed a high risk of MSDW over the past 2 years, with 82.6% having at least one MSDW during this period. Muscle strain,

tendinitis, and vertebral disk problems were common, with lower back pain being the most common (68.8%). Risk factors included manual therapy techniques, prolonged static postures, and repetitive tasks. Some therapists considered leaving the profession due to MSDW. Alnaser and Aljadi [30] studied MSDW among physiotherapists in Kuwait and revealed a 48% prevalence of MSDW over a 12-month period. They attributed this to occupational demands, poor working practices, and inadequate working environments, with lower back injuries, muscle spasms, and strains being the most common problems. Factors such as increased workload and manual therapy techniques contributed significantly. Physiotherapists often adapt their working practices after injuries, emphasizing the importance of education on ergonomic principles to prevent MSDW.

Ameer and Ashour [31] conducted a survey among physiotherapists in Egypt to investigate the risk factors, prevalence, severity, and characteristics of MSDW. Physiotherapists showed a higher prevalence, probably due to increased physical activity and perceived weaker strength. The physiotherapists working in the field of orthopedics had the highest rates of MSDW, followed by those working in the pediatric field, and those working in the neurology field, with manual therapy techniques posing a high risk. The lower back was most affected, which was attributed to patient-care activities and lack of ergonomic controls, with pain intensity related to workload rather than years of experience. Kakaraparthi *et al.* [32] surveyed 125 qualified physiotherapists and revealed a high prevalence of MSDW, with 83.8% having experienced symptoms in the prior 12 months. The lower back was most affected (63.7%), and sex was significantly associated with neck and shoulder problems. Physiotherapists reported 2–5 episodes of MSDW, mostly involving pain, cramps, and stiffness, and stressed that they often seek physical therapy treatment. The daily handling of many patients and prolonged static postures have been identified as risk factors contributing to MSDW, with changing patients' and therapists' postures being a common management strategy. These findings highlight the importance of interventions and ergonomic measures that address factors such as patient load and static posture to reduce the risk of MSDW among physiotherapists.

Yi *et al.* [33] conducted a survey among Malaysian physiotherapists and reported a high prevalence of MSDW, which mainly affects the wrists/hands and lower back. Manual therapy techniques, despite their therapeutic benefits, may increase the risk. Gender differences were observed, with women having higher levels of pain in different areas. Moreover, ergonomic workplace settings and patient workload had a significant influence on the occurrence of MSDW. Trunk bending/twisting, excessive workload, poor workplace ergonomics, continuing work despite MSDW, and psychological stress have been shown to be important contributing factors to MSDW. This underscores the

**Table 1: Characteristics of the studies included**

Authors	Place of study	Aim	n	Prevalence (%)		Risk factors	Findings
				Lifetime	12-month		
Iqbal and Alghadir, 2015 [27]	India	To report the prevalence of MSDW and correlate factors, such as age, gender, and work environment, with work and non-work activities of daily living.	75	92%; Lower back 51% Neck 17% Shoulder 12% Upper back 10% Hands 7% Elbow, buttocks, thighs, leg, foot 62%		Frequent strenuous back position during work, high job demand, repetitive shoulder/hand movements, patient lifting, exertion, low job control.	Most males complained of pain in lower back, neck, and shoulder, while females reported pain in the hand and knee. Sudden pain and pain at the time of the survey were reported. They reported pain after entering physical therapy practice. The duration of pain was longer in the female population. Sports physiotherapists had the highest risk of developing MSDW.
Anyfantis and Biska, 2018 [28]	Greece	To explore the experiences of MSDW, their causes, risk factors, specific measures, and good practices.	252	89%; 32.2% in the first 5 years of working. Lower back 38% Upper back 19% Shoulders 12% Neck 10% Wrists 9%		Performing the same task over and over, adopting awkward body positions, abrupt responses, using significant force, psychosocial issues, working environment, anthropometric characteristics.	The most burdened physiotherapists were those working as private practitioner and almost half of them were working while injured. There was a strong correlation between the workplace and the use of special work equipment. Physiotherapists minimize the risk of MSDW by attending physical therapy sessions, improving their working posture, and taking ergonomic stances.
Khairy <i>et al.</i> , 2019 [29]		To investigate the prevalence, profile, predictors, and response to MSDW.	501	82.6% within the last 2 years Lower back 68.8% Shoulder 40.8% Neck 36.7% Upper back 30.2% Wrist 29% Knee 27.1% Elbow 8% Ankle 7% Hip 4.6%		Performing manual therapy techniques, maintaining a posture for a prolonged period of time, performing repetitive tasks.	More than half of physiotherapists (54.8%) reported that their injury occurred in a private setting, and 20% of them were working when physically fatigued. Approximately 73.9% of physiotherapists did not officially report their injury. Physiotherapists report coping strategies such as changing working postures, improving body mechanics, and taking more breaks during the workday.
Alnaser and Aljadi, 2019 [30]	Kuwait	To determine the prevalence and risk factors associated with MSDW.	312		48% Lower back 55% Wrist and hand 20% Neck 11% Shoulder 7%	Performing manual therapy techniques, transferring a patient, lifting.	90% of the physiotherapists adapted their behavior after sustaining injuries, either by using proper body mechanics, changing position frequently, working out to increase strength, or encouraging patient responsibility during treatment. To avoid future episodes, physiotherapists limited patient contact time, narrowed their area of practice, and considered changing their jobs.
Ameer and Ashour, 2020 [31]	Egypt	To evaluate the characteristics and prevalence rate of MSDW among physiotherapists in accordance with their sex, setting, specialty, affected body parts, and methods of treatment used.	220	Lower back 56.82% Neck 14.55% Upper back 11.82% Shoulder 7.7% Wrist/hand 3.2% Knee 2.7% Elbow 1.8% Hip 1.4%		Using manual therapy techniques (massage, mobilizations, and manipulations; improper lifting or transferring), followed by those who applied electro-manual or electrical modalities.	Physiotherapists working in the field of orthopedics were exposed to the largest number of risk factors, followed by those working in the pediatric field and neurology field. The highest prevalence of MSDW was found among physiotherapists who used manual therapy methods
Kakaraparthi <i>et al.</i> , 2021 [32]	Saudi Arabia	To investigate the prevalence of MSDW and their association with demographic factors, work settings, and professional characteristics among physiotherapists; to analyse the work factors that physiotherapists identified as contributors to MSDW; to evaluate the strategies physiotherapists used to combat MSDW.	113		83.8% Lower back 63.7% Neck 59.2% Shoulder 40.7% Wrist and hand 23.8% Upper back 20.3% Knees 14.1% Thumbs 13.2% Elbow and forearm 10.6% Ankle and foot 7.9% Hip and thigh 4.4%	Treating several patients per day.	Risk factors that physiotherapists identified as contributors to MSDW were: treating a greater number of patients in 1 day; working in the same position; lifting the patients; working in an awkward posture; transferring the patients; performing manual therapy techniques; bending/twisting for a long period of time; assisting patients during gait activities; and carrying/lifting heavy loads. The most common strategies used by physiotherapists to combat MSDW were: modifying patient's position during treatment; modifying physiotherapist's position during treatment; selecting techniques that do not increase their discomfort; and adjusting bed height before starting the treatment.
Yi <i>et al.</i> , 2022 [33]	Malaysia	To increase awareness of MSDW among physiotherapists, enabling early interventions, measures and preventive ergonomics to reduce the prevalence of MSDW among physiotherapists in the future.	387		Wrist/hand 65.9% Neck 52.5% Lower back 41.3% Shoulder 26.9% Upper back 26.4% Knee 18.3% Hip/thigh 10.9% Ankle/toes 9.6% Elbow 6.2%	Work settings, number of patients treated per week, manual therapy application, frequent trunk bending/twisting, excessive workload, poor workplace ergonomics, continuing work despite MSDW and psychological stress.	The survey showed a high prevalence of MSDW among physiotherapists. Hence, it is important that we introduce appropriate and adequate early interventions, measures, and ergonomics in the future to prevent further MSDW and improve the quality of work and life among physiotherapists.

(Contd...)

**Table 1: (Continued)**

Authors	Place of study	Aim	n	Prevalence (%)		Risk factors	Findings
				Lifetime	12-month		
Le <i>et al.</i> , 2024 [34]	Vietnam	To determine whether potential risk factors contributed to the occurrence of MSDW among physiotherapists.	267	76.4%	76.4% Neck 58.4% Lower back 57.3% Shoulder 51.7% Wrists/hands 34.8% Knees 33.0% Upper back 31.5% Thumbs 22.9% Ankles/feet 14.6% Hips/thighs 11.6% Elbows 7.9%	Hand techniques, lifting/transfer, awkward postures	More than 50% of physiotherapists modified their positions or the patients' positions, suspended the treatment that aggravated their symptoms, and selected new treatment techniques. The most common coping strategies were: modifying the patients'/therapists' position; selecting techniques that will not aggravate discomfort; stopping treatment if it causes discomfort; and adjusting the plinth/bed height before treating a patient.

multifactorial nature of these disorders and the need for comprehensive ergonomic interventions, workload management strategies, and psychological support for physiotherapists. Le *et al.* [34] studied the prevalence of MSDW and associated factors among Vietnamese physiotherapists in Ho Chi Minh City by analyzing data from 267 participants in different healthcare settings. They observed a high prevalence of MSDW (76.4%), mainly affecting the neck, lower back, shoulders, and wrists/hands. Factors such as age, level of education, years of experience, and specialty hospital/clinic were associated with the occurrence of MSDW, whereas the prevalence was lower for physiotherapists working in the field of orthopedics. Manual therapy techniques and work-related tasks were significant risk factors. Environmental factors, such as physical therapy treatment tables, the size of the electrotherapy room, and psychological stress, also contributed to MSDW. Coping strategies included changing positions and treatment techniques, although some physiotherapists did not make ergonomic adjustments or seek help when dealing with difficult patients. This study highlights the importance of ergonomic practices, workload management, and stress reduction interventions in promoting occupational health and safety among physiotherapists.

#### **Characteristics of the included studies**

Eight of the studies published in the English language over the last decade were published in 2015 and 2018, and two studies were published in 2019, 2020, 2021, 2022, and 2024, respectively. In total, 2127 physiotherapists participated in the selected studies, and the sample sizes of the eight articles included in this systematic review ranged from 75 to 501 physiotherapists. A systematic review of the literature showed that only one study came from Europe [28], while the rest came from other parts of the world: Two from North Africa [29], [31], two from the Middle East [30], [32], and three from Asia [27], [33], [34].

There were some differences regarding the age of the included physiotherapists. For example, studies by Iqbal and Alghadir [27], Khairy *et al.* [29] and Le *et al.* [34] included physiotherapists who were on average younger than 30, while studies by Alnaser and Aljadi [30], Ameer and Ashour [31] and Kakaraparthi

*et al.* [32] included physiotherapists who were on average between 30 and 35 years old. One study, that is, Yi *et al.* [33], included physiotherapists aged between 22 and 32 years, while one study, that is, Anyfantis and Biska [28], included physiotherapists who were on average 42.18 years old. In most of the studies, the female population was predominant [30], [31], [33], and [34]. However, in the study by Khairy *et al.* [29], exactly half of the population was female and half was male. In three studies [27], [28], and [32], the male population of physiotherapists was predominant.

#### **Work-related musculoskeletal disorders prevalence**

The prevalence of MSDW was the main objective of most studies included in our systematic review [27], [29], [30], [31], [32], and [33]. Khairy *et al.* [29] examined the profile, predictors, and response to MSDW, while Kakaraparthi *et al.* [32] investigated the associations among demographic factors, the work environment, and professional characteristics among physiotherapists. Iqbal and Alghadir [27] reported the prevalence of MSDW and the correlation of factors such as age, gender, and work environment with work and non-work activities of daily living. Alnaser and Aljadi [30] determined the prevalence and risk factors associated with MSDW, while Ameer and Ashour [31] assessed the characteristics and prevalence rate of MSDW among physiotherapists according to their sex, environment, specialty, body parts affected, and treatment methods used. Yi *et al.* [33], however, wanted to increase physiotherapists' awareness of MSDW and thereby enable early action, measures, and ergonomic prevention mechanisms to reduce the prevalence of MSDW among physiotherapists in the future. Two studies [28], [34] had slightly different aims. Anyfantis and Biska [28] investigated MSDW experiences, causes, risk factors, specific measures, and good practices; however, Le *et al.* [34] aimed to determine whether potential risk factors contributed to the occurrence of MSDW among physiotherapists.

Four articles selected for this systematic review focused on 12-month prevalence [30], [32], [33], and [34], three on lifetime prevalence [27], [28], and [31], and one on prevalence within the last 2 years [29]. The highest reported prevalence was

92% [27]. This is followed by a prevalence of 89% [28], 83.8% [32] and 82.6% [29], respectively. Furthermore, Le *et al.* [34] reported a prevalence of 76.4%, while the lowest prevalence of 48% was detected in the study by Alnaser and Aljadi [30]. Two studies did not report percentage prevalence [31], [33]. The most affected body parts were the lower back, followed by the neck and shoulder girdle, as reported in all eight studies [27], [28], [29], [30], [31], [32], [33], and [34]. Seven studies reported pain in the upper back [27], [28], [29], [31], [32], [33], and [34], five in the knees [29], [31], [32], [33], and [34], and in the wrists and hands [30], [31], [32], [33], and [34]. Four studies reported that elbows were also affected among physiotherapists [29], [31], [33], and [34], and three studies reported pain in hips and thighs [32], [33], and [34]. Studies have also reported effects on the elbows and forearms [32], elbows, buttocks, thighs, legs, feet [27], ankles and toes [33], ankles only [29], and hands [27].

### **Job risk factors**

The literature review revealed that most of the surveys [27], [28], [29], [30], [32], and [34] investigated or identified risk factors that had contributed to the occurrence of MSDW among physiotherapists. On the other hand, Ameer and Ashour [31] assessed the characteristics and prevalence rates of MSDW among physiotherapists according to their sex, setting, specialization, body parts affected and treatment methods used. Yi *et al.* [33] aimed to increase physiotherapists' awareness of MSDW, thereby enabling early intervention, measures, and ergonomic prevention mechanisms to reduce the prevalence of MSDW among physiotherapists in the future. In addition, most studies [28], [30], [31], [33], and [34] included a sample of 200–400 physiotherapists, two studies [27], [32] included fewer than 100 physiotherapists, and only one study [29] included more than 500 physiotherapists.

### **Important findings of the included studies**

Overall, the results of the studies analyzed show that most physiotherapists expressed very similar risk factors for MSDW, such as back strain [27], prolonged posture [29], frequent bending/turning of the trunk [33], and awkward postures [28], [34]. In addition, performing manual therapy techniques or the use of manual therapy [29], [30], [31], [33], and [34] have been cited 5 times as risk factors for MSDW. Patient lifting [27], patient transfer and lifting [30], inappropriate lifting or carrying activities [31], and lifting/carrying [34] have been reported 4 times. Repetitive tasks [27], [28], and [29] have been cited in three studies as risk factors for MSDW. Work environment [28], [33], psychosocial issues [28], and psychological stress [33] were mentioned in two studies, while one study mentioned excessive workload and poor workplace ergonomics

[28]. In the study by Yi *et al.* [33], physiotherapists stated that they continued working despite MSDW. In the study by Iqbal and Alghadir [27], physiotherapists reported that high job demand, exertion and low job control are risk factors for MSDW. Abrupt responses, significant forces and anthropometric characteristics were reported in the study by Anyfantis and Biska [28] as risk factors for MSDW. Studies have also revealed the subspecialties of physiotherapists who are commonly at high risk for MSDW, such as physiotherapists working in sports [27], physiotherapists working as private practitioners [28], and physiotherapists working in the field of orthopedics, pediatrics, or neurology [31].

The overview of the MSDW prevalence and job risk factors among physiotherapists highlights the need for proactive measures to protect their health and well-being. This emphasis on preventive strategies aims to improve patient care quality and ensure the sustainability of professionals within the field. Furthermore, the analysis underscores the multifaceted nature of MSDW, calling for collaborative efforts among various stakeholders to address identified risk factors. By implementing targeted interventions and promoting a holistic approach encompassing ergonomic improvements, education, and organizational support, we can create healthier work environments for physiotherapists. In conclusion, the analysis of the included studies reveals the prevalence of MSDW was a primary focus, with studies examining various aspects including prevalence rates, associated risk factors, and the impact on physiotherapists' daily activities. These studies highlighted a wide range of prevalence rates and identified common affected body parts, predominantly the lower back, neck, and shoulder girdle. Future research should be focused on minimizing or pain management MSDW [35] and discussed strategies to prevent them.

## **Discussion**

This collection of studies examining the prevalence, risk factors, and characteristics of MSDW among physiotherapists across different countries has revealed a research gap. Geographically, the studies were diverse, with only one originating from Europe, two from North Africa, two from the Middle East, and three from Asia. The predominant focus of the studies was on determining the prevalence of MSDW, with most aiming to identify associated risk factors. The systematic review has shown that physiotherapists mentioned the lower back, neck, and shoulders as the body parts most affected by MSDW. These were followed by other body parts, which were less represented in percentage terms. Only one cross-sectional prospective study on a sample of 102 physiotherapists was conducted

in Slovenia [36]. The 12-month incidence of MSDW was 92.2%, with the highest prevalence of pain in the neck (64%) and lower back (63%). We have found a high prevalence of MSDW among physiotherapists, so it would be wise to train physiotherapists in MSDW coping strategies and proper movement patterns during their education. We believe that, given the nature of their work, physiotherapists should become familiar with and learn how to use ergonomic aids that would save them considerable discomfort/pain in their daily practice. Of course, we should not overlook the fact that physiotherapists need to be in a good physical and psychological state from the outset to cope better with possible MSDW. Our review has shown that the risk factors were the same/similar in all eight studies, namely: back strain, awkward posture, prolonged posture, frequent bending/turning of the trunk, performing manual therapy techniques, lifting patients, repetitive tasks, work environment, and psychosocial problems. Although physiotherapists were aware of the risk factors and ergonomic measures to reduce the prevalence of MSDW, they may have taken action too late. This may also be due to the fact that most studies focused on identifying associated risk factors and possible interventions. Overall, these studies highlight the importance of addressing MSDW among physiotherapists through ergonomic practices, workload management, and stress reduction interventions to ensure their occupational health and safety.

Physiotherapists are exposed to more severe ergonomic risks. Future research should be based on quantitative studies on physiotherapists' ergonomic risks. Physiotherapy education should focus not only on the ergonomics of the patient but also on the ergonomics of the physiotherapist [37]. The systematic review of eight studies on MSDW predominantly focusing on prevalence, risk factors, and coping strategies revealed prevalence rates ranging from 48% to 92%, with the lower back being the most affected body part. Consistent risk factors included back strain, awkward postures, and performing manual therapy techniques, while coping strategies involved changing work positions and utilizing ergonomic equipment. Early intervention and ergonomic measures were emphasized to reduce MSDW prevalence, highlighting the importance of addressing occupational risk factors for physiotherapists' well-being and quality of work life. It also underscores the alarming prevalence and profound impact of MSDW among physiotherapists.

Numerous studies, such as Choobineh *et al.* [38], reveal staggering statistics, indicating that a significant proportion of physiotherapists experience MSDW, affecting their quality of life, productivity, and professional longevity. Such findings underscore the urgent need for comprehensive strategies to address these occupational hazards effectively. Del Campo *et al.* [39] identified in their study in healthcare workers pre-existing anxiety and/or depression as risk factors

associated with MSDW. They yielded some positive results on MSDW prevention, like what we showed in our review. It would be beneficial to assess and attempt to improve the psychological health of healthcare workers before they develop MSDW and to study the ergonomic conditions under which they perform their duties. Despite the challenges posed by occupational risk factors, the analysis reveals promising preventive strategies that can be implemented to alleviate the burden of MSDs among physiotherapists. Like our results, Karanikas and Jani [40] present in their study frequent risk factors such as manual techniques and repetitive activities.

The strengths of the included studies lie in their extensive geographical representation. This diversity provides valuable insights into the prevalence and characteristics of MSDW among physiotherapists on a global scale. The substantial sample sizes, ranging from 75 to 501 participants, enhance the robustness and generalizability of the findings. The studies offer a comprehensive examination of MSDW, focusing not only on prevalence rates but also on associated risk factors, coping strategies, and the impact on physiotherapists' daily activities. Considering some limitations, the results of this review should be interpreted with caution. The use of keywords and databases with inclusion or exclusion criteria may have led to the exclusion of some works that could have corroborated our results. The predominance of studies focusing on prevalence rates may limit the understanding regarding the underlying factors contributing to MSDW among physiotherapists. The variation in study objectives and methodologies across the included studies may introduce heterogeneity, potentially impacting the comparability and synthesis of findings. The underrepresentation of certain geographical regions, particularly Europe, may restrict the generalizability of findings to a global context, highlighting the need for more extensive research in these areas to ensure comprehensive insights into MSDW among physiotherapists.

## Conclusion

The aim of this systematic literature review was to summarize the published information on the prevalence of MSDW for different body parts and risk factors for physiotherapists. We also searched for prevention methods or coping strategies among physiotherapists, which were identified in six articles [28], [29], [30], [32], [33], [34]. The coping strategies used by physiotherapists included changing their working posture, improving their body mechanics, taking more breaks, and using ergonomic equipment. Studies have highlighted the importance of early intervention and ergonomic measures to reduce the prevalence of MSDW among physiotherapists. It is evident that

addressing occupational risk factors and adopting appropriate coping strategies are key measures to improve the quality of work and life of physiotherapists.

Our analysis highlights the urgent need for comprehensive strategies to effectively address MSDW to ensure the occupational health and safety of physiotherapists. In conclusion, our analysis provides critical insights into the prevalence, parts of the body most often affected risk factors, and management strategies for MSDW among physiotherapists and highlights the need for proactive measures to mitigate occupational risks and ensure the vitality of this essential health profession.

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