REVIEW

An overview of the prevalence and associated factors of work-related musculoskeletal disorders among textile workers

Nguyen Thanh Hai[1]*, Nguyen Thu Hien[1], Nguyen Quang Duc[1]

ABSTRACT

Background: Textile workers are highly susceptible to work-related musculoskeletal disorders (WMSDs) due to repetitive tasks and poor ergonomic practices. This overview aims to synthesize available evidence on the prevalence of WMSDs and associated factors among textile workers globally. **Methods:** A systematic search was conducted on studies retrieved from databases and sources between 2010 and 2024. Inclusion criteria were: (1) observational studies on textile workers; (2) reporting prevalence and/or associated factors for WMSDs; (3) English-language publications. Data on study design, sample size, prevalence, and identified associated factors were extracted and analyzed narratively. **Results:** Thirteen studies from Bangladesh, India, Indonesia, Thailand, Sri Lanka, Cambodia, and Ethiopia were included. Prevalence of WMSDs ranged from 69.5% to 87%, with the lower back, neck, and shoulders most frequently affected. Common associated factors included repetitive motion, awkward postures, long work hours, lack of ergonomic training, and gender. Studies also highlighted psychosocial stress and non-compliance with occupational health standards as exacerbating factors. **Conclusion:** WMSDs are highly prevalent among textile workers and are influenced by multiple ergonomic, individual, and organizational factors. Multidimensional interventions focusing on ergonomic improvement, worker education, and policy enforcement are essential.

Keywords: *work-related musculoskeletal disorders (WMSDs), textile workers, associated factors, overview*

[1] *Hai Phong University of Medicine and Pharmacy, Vietnam*

* **Corresponding author**
Nguyen Thanh Hai
Email: nthanhhai@hpmu.edu.vn

INTRODUCTION

Musculoskeletal disorders, which primarily affect muscles, tendons, and nerves, represent a substantial burden in occupational health, accounting for a large proportion of absenteeism and disability worldwide (1). According to the World Health Organization (WHO), musculoskeletal conditions are the leading contributor to disability worldwide, and many of these are linked to occupational exposures. Approximately 1.71 billion people globally live with musculoskeletal conditions, which are the leading contributors to disability-adjusted life years (DALYs) worldwide, with low back pain alone accounting for 570 million prevalent cases (1). Work-related musculoskeletal disorders (WMSDs) are injuries or

dysfunctions of the musculoskeletal system caused or aggravated by work-related activities (2). They typically affect the neck, shoulders, upper and lower back, wrists, and lower limbs, and are associated with symptoms such as pain, numbness, stiffness, and reduced mobility. WMSDs develop gradually due to cumulative trauma, often stemming from repetitive tasks, awkward postures, forceful exertions, or insufficient recovery time between tasks (2). The burden of WMSDs is not only clinical but also socio-economic. Affected workers often experience reduced work capacity, job dissatisfaction, and psychological distress (3,4). In the absence of effective interventions, WMSDs can lead to chronic conditions, further straining both healthcare systems and the workforce.

The textile industry, one of the largest and most labor-intensive manufacturing sectors worldwide, employs millions of workers, particularly in low- and middle-income countries. A significant proportion of these workers, especially women, are exposed to prolonged sitting, repetitive movements, and poor ergonomic conditions, which place them at heightened risk of developing WMSD. Among these workers, the prevalence of WMSDs varies significantly by region, factory conditions, and job tasks, but consistently demonstrates a high rate of occurrence. Systematic reviews of garment workers reveal MSD prevalence ranging from 15.5% to 92%, with a pooled prevalence around 65.6% (95% CI 44.5–51.9%), particularly affecting the neck and low back (5). Despite their prevalence, WMSDs among textile workers are often under-recognized and insufficiently addressed in occupational health policies, especially in informal or under-regulated settings.

This systematic review aims to consolidate empirical evidence on the prevalence and determinants of WMSDs among textile workers to inform health policy, guide workplace interventions, and identify research gaps.

METHOD

Overview methodology

Inclusion and Exclusion Criteria

English-language articles published between 2010 and 2024 in reputable journals, meeting the inclusion and exclusion criteria. Inclusion criteria: Full-text articles written in English, focused on garment or textile workers, and reported prevalence and/or associated/risk factors for WMSDs. Exclusion criteria: Literature reviews, systematic reviews and meta-analyses; Conference abstracts, research protocols; Interventional studies without baseline prevalence data; Articles that are purely theoretical in nature; Studies not specific to garment/textile workers.

Search Strategy

A structured search was performed using databases including PubMed, Scopus, and Google Scholar between 2010 and 2024, along with citation tracking from Zotero bibliographies. Search terms included combinations of: "musculoskeletal disorders", "musculoskeletal symptoms" "textile/garment workers", "textile industry", "textile laborers", and "textile employees". The search strategy diagram is shown below:
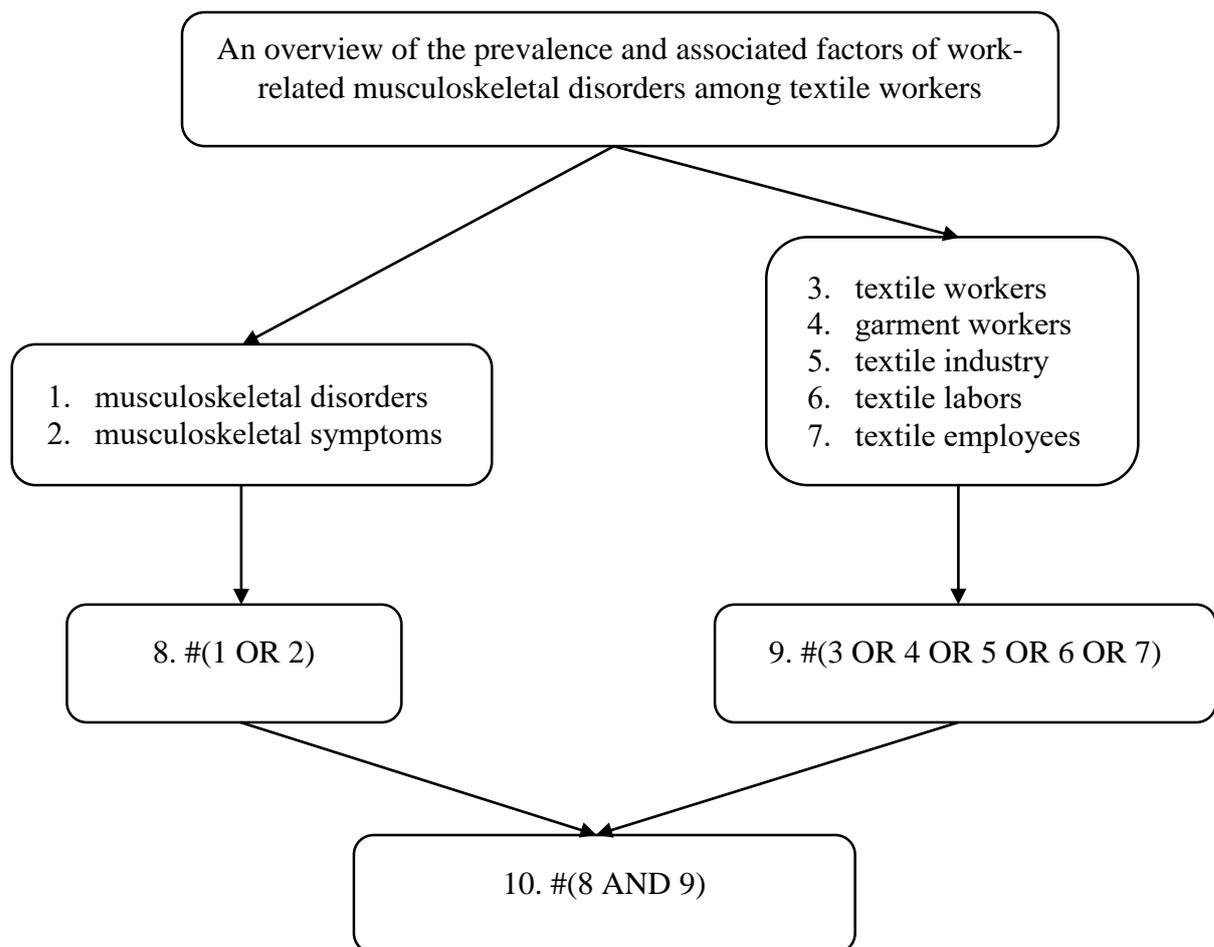
Figure 1. Document search strategy

Search results and document selection

A total of 215 studies were found through PubMed, Scopus, and Google Scholar. After being eliminated due to duplicate documents, titles and abstracts, along with the inclusion and exclusion criteria, 21 articles were included in the full-text screening, further filtering and entering data for each selected article based on predefined extraction criteria, and evaluating the quality of the article. The number of remaining articles was finally 13 articles.

Characteristics of studies

Thirteen studies from Bangladesh, India, Indonesia, Thailand, Sri Lanka, Cambodia, and Ethiopia were included. All studies had a cross-sectional design. Only one study from Bangladesh reported a sample size of 350.

Study quality assessment

All included studies were observational and assessed for quality using the National Heart, Lung, and Blood Institute's Quality Assessment Tool for Cross-Sectional Studies. Assessments were performed independently by two investigators. In cases of disagreement, a third investigator was involved to provide a final consensus assessment.

Data Extraction and Analysis

Data extracted included: author, year, country, study design, sample size, reported prevalence, affected body regions, and associated/risk factors. A narrative synthesis

was performed given the heterogeneity in study methods and outcomes.

RESULTS

Table 1. *Study Characteristics*

Study	Country	Sample Size	Study Design	Prevalence of WMSDs (%)
Shazzad et al. (2018)	Bangladesh	350	Cross-sectional	80%
Pal et al. (2021)	India	NR	Cross-sectional	87%
Mahendran & Tiwari (2024)	India (Tamil Nadu)	NR	Cross-sectional	69.5%
Van et al. (2016)	Cambodia	NR	Cross-sectional	77.2%
Hossain et al. (2018)	Bangladesh	NR	Cross-sectional	78%
Muhamad Ramdan et al. (2020)	Indonesia	NR	Cross-sectional	71.3%
Others (n = 7)	Sri Lanka, Thailand, Ethiopia	NR	Cross-sectional	70–85% (range)

Note: NR = Not Reported

The prevalence of WMSDs across studies is consistently high (69.5%–87%), suggesting a widespread occupational health concern in textile sectors regardless of geographic context. This underlines the urgent need for cross-national ergonomic reforms.

Table 2. *Body Regions Affected by WMSDs*

Body Region	Prevalence Range (%)
Lower Back	63.5% – 81%
Neck & Shoulders	53% – 70%
Wrists & Upper Limbs	20% – 45%

Comment: The lower back, neck, and shoulders are the most affected regions, reflecting the impact of static postures and repetitive upper-body tasks that dominate textile manufacturing work.

Table 3. *Summary of related Factors Identified Across Studies*

Risk Factor Category	Specific Factors	Supporting Studies
Ergonomic & Physical	Prolonged sitting, repetitive tasks, poor workstation design	Shazzad et al. (2018), Hossain et al. (2018), Muhamad Ramdan et al. (2020), Amarasinghe & De AlwisSenevirathne (2016)
Demographic & Gender	Female gender, older age, high BMI	Angeline & Bobby (2017), Abraha et al. (2018)
Psychosocial & Organizational	Job stress, low autonomy, poor OHS	Nabi et al. (2021), Terfe et al. (2023), Hasan et al. (2021)

Risk Factor Category	Specific Factors	Supporting Studies
	compliance, limited access to healthcare services	

Ergonomic hazards were the most frequently cited risk factors, followed by demographic and organizational issues. The convergence of physical and psychosocial risks highlights the need for comprehensive interventions that combine design changes, worker training, and management-level policies.

DISCUSSION

This overview highlights the consistently high prevalence of work-related musculoskeletal disorders among textile workers across various low- and middle-income countries. The findings align with global occupational health concerns, confirming that WMSDs remain a significant burden in this labor-intensive industry. Across the 13 included studies, the prevalence of WMSDs ranged from 69.5% to 87%, with the lower back, neck, and shoulders identified as the most affected regions (6–9). This pattern reflects the biomechanical demands placed on workers due to repetitive motions, static postures, and poor ergonomic design of workstations. The lower back was consistently reported as the most affected anatomical region, with prevalence rates between 63.5% and 81% (10,11). These findings are consistent with previous literature indicating that prolonged sitting, forward bending, and load handling are common among sewing machine operators and handloom weavers (12). Moreover, neck and shoulder disorders - reported by over half the respondents in several studies - can be attributed to repetitive hand movements, static neck postures, and lack of movement variability during repetitive tasks (6,10).

Ergonomic and physical factors were the most commonly reported risk categories across the studies. Poorly designed workstations, repetitive hand tasks, and prolonged sitting were identified as key contributors (6,11,12). These findings corroborate the role of biomechanical load in the pathogenesis of musculoskeletal injuries and underscore the need for ergonomic redesign as a primary preventive strategy.

Beyond physical factors, demographic and individual variables such as gender, age, and body mass index (BMI) were also associated with higher prevalence of WMSDs. Several studies found that female workers were disproportionately affected by WMSDs, especially in relation to neck and shoulder pain (13,14). This gender disparity may stem from physiological differences, the dual work burdens (domestic and occupational), and role segregation in the workplace, where women are more frequently assigned repetitive or sedentary tasks.

Psychosocial and organizational determinants - such as job stress, limited decision-making autonomy, and lack of access to occupational health services - also emerged as important contributors to WMSDs (15–17). Workers in non-compliant factories, for example, had a significantly higher prevalence of musculoskeletal complaints compared to those in Occupational Safety and Health-compliant settings (15). This highlights the compounded vulnerability faced by workers in informal or poorly regulated environments.

In addition, the results indicate that younger workers may not necessarily be at lower risk, as previously assumed. Instead, some studies reported no significant association between age and WMSDs, suggesting that task characteristics and exposure duration might be more critical determinants than chronological age alone (7,8). Furthermore, lack of physical fitness and muscle endurance were associated with increased discomfort, particularly among informal workers with little rest time or health promotion support (18).

The consistency of findings across diverse settings - Bangladesh, India, Ethiopia, Cambodia, and others - suggests that WMSDs among textile workers are not solely a local or regional issue but a global occupational health challenge, especially in countries with weak enforcement of labor standards. The convergence of ergonomic, demographic, and organizational risks supports the application of multidimensional intervention strategies, including ergonomic redesign, psychosocial risk management, health education, and strict enforcement of occupational safety and health policies.

However, this review also revealed several limitations in the existing body of evidence. Most included studies were cross-sectional in nature, which limits causal inference. Only a few studies used standardized tools to assess ergonomic risks or musculoskeletal symptoms, potentially reducing the comparability of findings (e.g., Amarasinghe & De Alwis Senevirathne, 2016). Moreover, very few studies explored the longitudinal impact of WMSDs or evaluated the effectiveness of workplace interventions, signaling a critical gap in evidence for preventive strategies.

In light of the high burden of WMSDs among textile workers, especially in under-resourced settings, future research should prioritize longitudinal cohort studies and intervention trials. These studies should assess the sustainability and scalability of workplace improvements, such as adjustable furniture, task rotation, or the introduction of rest breaks, which have shown promise in other industrial sectors. In addition, worker empowerment and participatory ergonomics approaches may enhance adherence and effectiveness of such interventions.

In summary, WMSDs among textile workers are a pervasive and preventable occupational health concern. The convergence of physical, psychosocial, and organizational risk factors calls for an integrated, multi-level approach to both research and practice. Addressing these disorders is not only essential for improving worker health and productivity but also for advancing social justice and labor rights in global supply chains.

CONCLUSION

WMSDs among textile workers are highly prevalent and multifactorial in origin. Key drivers include ergonomic hazards, organizational practices, and worker-level vulnerabilities. Effective prevention requires ergonomic redesign, occupational safety and health policy enforcement, and awareness-raising among workers and employers. Future research should prioritize longitudinal studies and intervention trials that test scalable workplace solutions.

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