Institute of Experimental Morphology, Pathology and Anthropology with Museum
Bulgarian Anatomical Society

Acta Morphologica et Anthropologica, 32 (3-4)
Sofia ● 2025

# Prevalence and Risk Factors of Work-Related Musculoskeletal Disorders Among Professional Vehicle Drivers in India: A Review

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This comprehensive review explores the high prevalence of Work-Related Musculoskeletal Disorders (WRMSDs) among professional drivers in India's rapidly expanding transportation sector. The study analyzes 43 peer-reviewed articles covering various vehicle categories, including auto-rickshaws, two-wheelers, buses, taxis, heavy vehicles, and trucks. The findings reveal that low back pain is the most common complaint across all driver types, followed by neck, shoulder, and knee discomfort. Risk factors are categorized into occupational, vehicular, and personal domains. The review underscores the urgent need for ergonomic interventions, health surveillance, and policy reforms to safeguard the musculoskeletal health and overall well-being of India's professional drivers.

*Key words:* Musculoskeletal disorders, low back pain, ergonomics, risk factors, professional drivers, India

## Introduction

Work-related musculoskeletal disorders (WRMSDs) refer to impairments of the musculoskeletal system – including bones, tissues, tendons, joints, blood vessels, and nearby peripheral nerves – caused or aggravated by occupational activities or environments [32]. These include a wide spectrum of clinical syndromes such as tendinopathies, tenosynovitis, bursitis, neurological disorders like sciatica and carpal tunnel syndrome, osteoarthritis, and generalised pain syndromes such as low back pain [30]. WRMSDs are largely associated with poor ergonomics and constitute a major component of the global burden of occupational diseases [7].

According to the World Health Organization (WHO), musculoskeletal disorders are leading contributors to disability and limitations in daily and occupational functioning [4]. Professional drivers are particularly vulnerable to WRMSDs due to prolonged exposure to physical, environmental, and psychosocial stressors

[2,12]. Driving involves static postures, prolonged sitting, exposure to whole-body vibration, repetitive movements, and awkward positions, all of which contribute to the development of musculoskeletal pain and dysfunction [36].

Individual risk factors such as age, gender, body mass index (BMI), and overall health status also influence the susceptibility to WRMSDs [20,22]. Additionally, environmental exposures such as air and noise pollution further exacerbate the health risks faced by drivers. In India, road transport accounts for over 80% of passenger movement, and with economic growth and urbanisation, professional drivers are increasingly subjected to longer working hours, poor road conditions, and inadequate occupational support systems [23,34].

Under this background, the present review aims to synthesize existing literature to better understand the prevalence, distribution, and risk factors associated with WRMSDs among different categories of vehicle drivers in India.

## Materials and Criteria

A systematic review was conducted utilizing the databases like Scopus, PubMed and Web of Science alongside the Google Scholar search engine to comprehensively assess musculoskeletal disorders among professional drivers in India, focusing on publication years spanning the last 15 years. The search strategy included a precise combination of keywords – "musculoskeletal pain," "low back pain," "professional drivers," "work-related musculoskeletal disorders (WRMSDs)," and "ergonomics"- reflecting both clinical and occupational dimensions relevant to this population. Articles were initially screened for eligibility based on study design, population, and outcomes, with priority given to research detailing prevalence rates, risk factor analysis, and specific musculoskeletal phenotypes. Out of 50 identified studies, 33 fulfilled the inclusion criteria: peer-reviewed original research focused on Indian professional drivers, quantifying the prevalence of WRMSDs and investigating associated risk factors such as prolonged sedentary driving, whole-body vibration, inadequate workplace ergonomics, and psychosocial stressors. Selected studies predominantly employed cross-sectional methodologies, standardized musculoskeletal health surveys, and subgroup analyses addressing vehicle type and driving duration. The systematic review underscores the substantial occupational health burden borne by professional drivers in India and advocates for targeted ergonomic improvements, structured health promotion initiatives, and regulatory policy interventions that address the complex interplay between occupational exposure, job design, and musculoskeletal health outcomes.

## Results and Discussion

### •WRMSD prevalence among professional drivers by Vehicle Type (Figure 1)

Auto-rickshaw drivers exhibit a notably high prevalence of musculoskeletal complaints, particularly in the upper extremities. Neck pain affects approximately 81% of drivers, while shoulder discomfort is reported by 70%, with carpal tunnel syndrome

also frequently observed [13,14,26,33,37]. Studies suggest that scapular alignment abnormalities are significantly correlated with neck pain within this group [11].

Two-wheeler riders – motorbike and scooter operators – regularly report musculoskeletal stress localized to the upper back, shoulders, and neck, regardless of vehicle type, rider age, or gender [9]. This stress is predominantly attributed to poor ergonomic posture and the impact of road shocks [9,31].

Bus drivers are commonly afflicted with low back pain, with prevalence rates ranging widely from 49% to 85% depending on regional and study-specific factors [3,18,19,24,25,29,35,41]. Additional affected regions include the neck, shoulders, and knees. Ergonomic risk assessments using the Rapid Entire Body Assessment (REBA) and Rapid Upper Limb Assessment (RULA) tools consistently show high-risk scores for the back and shoulder regions in bus drivers, related to prolonged postures and inadequate seat design [10].

Taxi drivers demonstrate an 87% prevalence of WRMSDs, with 49% reporting low back pain specifically [8,28,38]. In private car drivers, the overall prevalence of musculoskeletal complaints reaches 77.4%, with 66% reporting low back pain within the past year [16,27].

Heavy vehicle operators, such as dumpers, also present a significant burden, with musculoskeletal discomfort reported by 58% to 74% of drivers [15]. Common sites include the back, ankle, and shoulder regions [21,39,40]. Among the crane operators, older drivers and those with longer job tenure report higher discomfort levels, especially in the back and neck, partly due to cabin design factors such as cabin height [6].

Truck drivers frequently report lower back pain, followed by discomfort in the knees, shoulders, and cervical spine [5]. Regional and geographical differences – such as hilly versus plain terrain – further influence WRMSD prevalence in this occupational group [1,17].

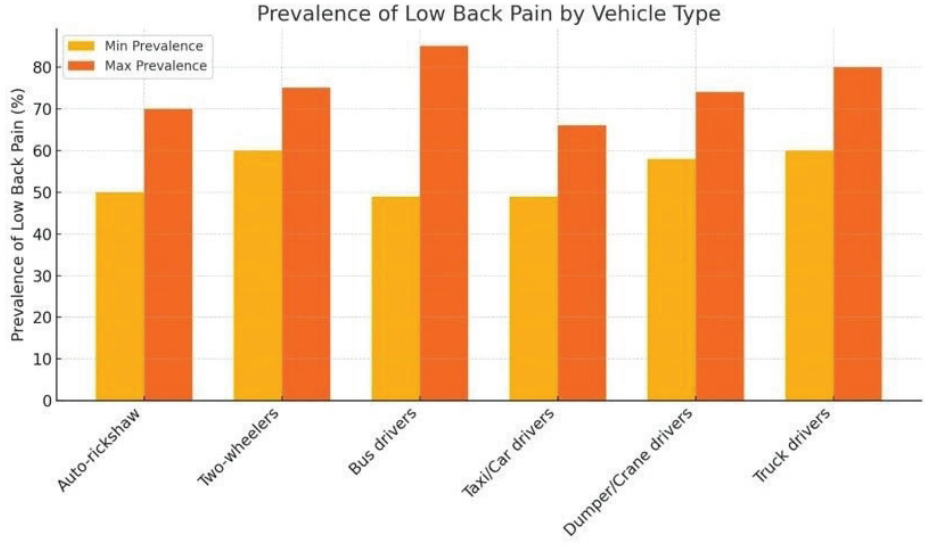


**Figure 1**

**Figure 1(a)**: Prevalence of low back pain by vehicle type

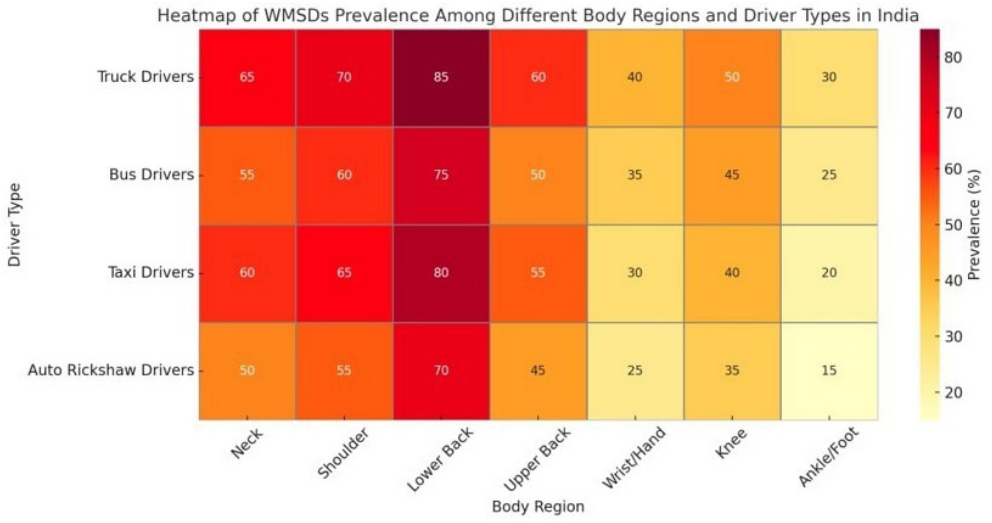


**Figure 1(b):** Heatmap of WRMSD prevalence among different body regions and driver types

## • Risk Factors for WRMSDs (Figure 2)

Occupational factors: MSDs can affect anyone as a result of long periods of driving per shift, daily average driving exceeding 200 kilometres and total duration of service [5,17,19,24]. The risk of discomfort increases with days per week driving exceeding 48 hours per week, daily average driving seems to play a crucial role in musculoskeletal pain [3,5,17]. Repetitive work, job demand, and work design also significantly perturbs the drivers' musculoskeletal health [38]. Psychosocial work factors, such as perceptions of unfair treatment, job strain, and effort-earning imbalance creates mental stress which contribute significantly to these disorders [5,8]. Lack of enough resting duration or break in between driving hours causes susceptibility towards body pain & discomfort [5].

Vehicle related factors: Back and neck pain risks are heightened by long-term exposure to vehicle vibration and awkward seating postures [5,15,21,24,35]. Vehicle ergonomics seems to play a crucial role in the susceptibility of musculoskeletal pain [30]. Poor road condition causing exertion to the body for longer period is revealed as a confounding factor for the rapid increasing rate of musculoskeletal pain among drivers [5].

Personal factors: Age is a significant predictor reported for the development of musculoskeletal disorder with older age correlating with an elevated risk of MSD pains [18,19,21,38,41]. The prevalence of WRMSDs seemed to be influenced by sociodemographic factors like marital status, children, education reported from a study conducted among the dumper operators [38]. Excessive fat deposition & body weight in the form of abdominal obesity & higher BMI were found as the comorbid factors for musculoskeletal disorders of the drivers specially backache [19,31,39]. Reduced engagement in physical activity and unhealthy dietary habits amplify the vulnerability to WRMSDs [10,41]. Substance & alcohol consumption also encompass as predictors of body pain but not very strongly [18, 41].

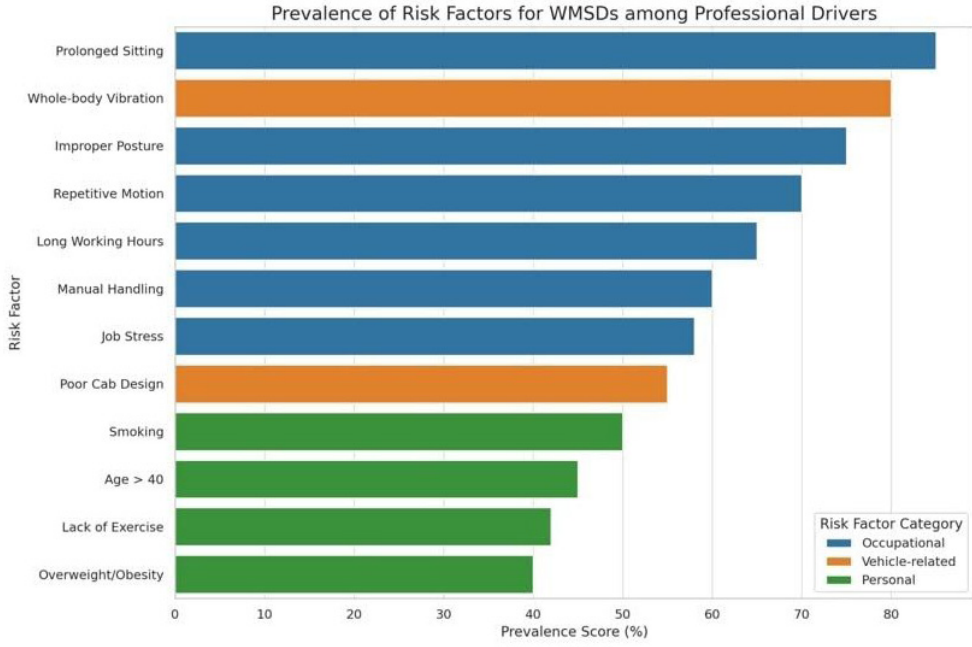


**Figure 2 (a):** Prevalence of risk factors for WRMSD among professional drivers

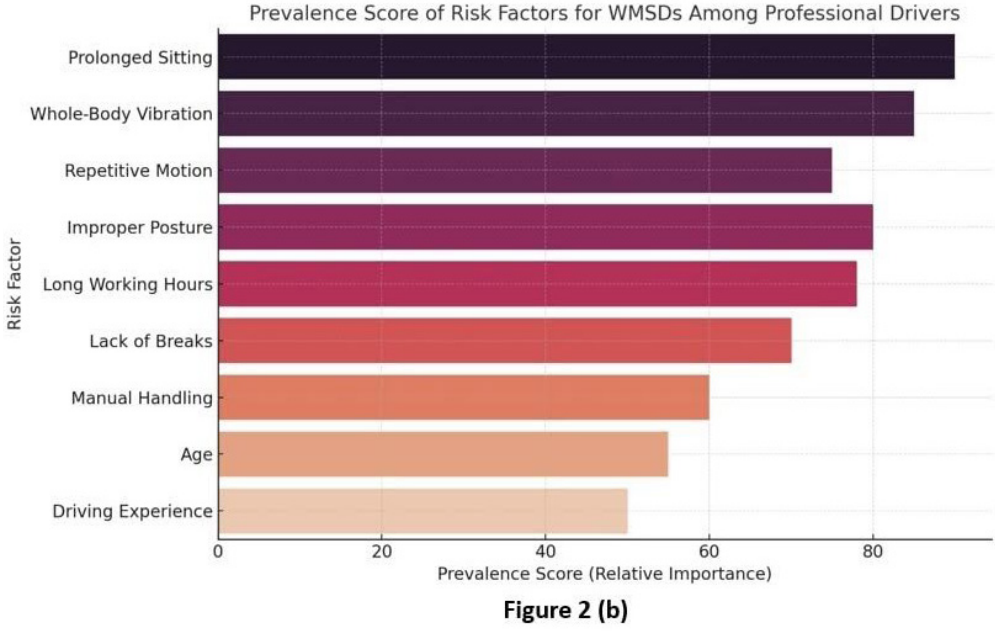


**Figure 2 (b):** Prevalence score of risk factors for WRMSD among professional drivers

## Conclusion

This review highlights the widespread burden of WRMSDs among professional drivers in India across multiple vehicle categories. Low back pain emerged as the most frequent issue, followed by neck, shoulder, and knee discomfort. The causes are multifactorial, involving occupational, vehicular, and personal risk factors.

**Recommendations**:

**1. Ergonomic Training:** Professional drivers should be provided with regular training programs focusing on proper posture, seat adjustment, and vehicle ergonomics to reduce the risk of musculoskeletal disorders.

**2. Health Monitoring:** Routine medical exams, including physiotherapy evaluations and follow-up assistance, should be instituted to monitor and manage early indicators of work-related health disorders among drivers.

**3. Policy Reforms:** Labor regulations should be established and enforced to ensure standardized working hours, mandatory rest breaks, and occupational health protections for professional drivers.

**4. Health Awareness:** Awareness campaigns should be launched to highlight the need of physical activity, balanced diet, and preventative healthcare practices in sustaining musculoskeletal health.

**5. Infrastructure Improvements:** Road infrastructure should be regularly assessed and maintained to minimise vibration-related musculoskeletal stress by lowering vehicle vibration and enhancing driving comfort.

Collectively, these ideas underline the necessity for a multidisciplinary approach incorporating ergonomic design, occupational health surveillance, policy intervention, and infrastructure development. Implementing these approaches can significantly improve the occupational well-being, safety, and long-term productivity of professional drivers.

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