

## CROSS-SECTIONAL ASSESSMENT OF THE PREVALENCE OF BACK PAIN AMONG INDUSTRIAL WORKERS

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### Abstract

**Background:** The study was conceptualized to investigate the prevalence of back pain among industrial workers and identify the major occupational risk factors contributing to it. **Material and Methodology:** A cross-sectional study was conducted on a representative sample of 500 industrial workers drawn from various sectors. Data was collected using a validated self-reported questionnaire that captured the incidence and intensity of back pain over the past 12 months. The descriptive and inferential statistical analysis were employed to understand the prevalence and associated risk factors. **Results:** The study disclosed a substantial prevalence of back pain among the industrial workers assessed. A noteworthy 24% of workers in the manufacturing sector and 30% in the construction sector reported experiencing back pain. In terms of occupational risk factors, 46% of the workers reported heavy manual labor, while 38% reported prolonged standing as contributing to their back pain. Poor ergonomics and a lack of regular physical exercise were identified as risk factors by 30% and 44% of the workers, respectively. The severity of back pain demonstrated a significant association with these identified risk factors, particularly heavy manual labor and lack of physical exercise. **Conclusion:** The findings underscore the pressing need for the introduction of improved ergonomic practices and reforms in occupational health policies in industrial settings. Future research should concentrate on formulating and evaluating effective preventive strategies to alleviate the problem of back pain among industrial workers.

## INTRODUCTION

Back pain is one of the most prevalent occupational health issues worldwide, leading to substantial economic, social, and health burdens (Ghaffari M *et al.*, 2006).<sup>[1]</sup> According to the World Health Organization (WHO), it is one of the leading causes of disability, affecting performance and productivity at the workplace (WHO, 2019). The problem is particularly pervasive among industrial workers due to the physically demanding nature of their jobs (Toroptsova NV *et al.*, 1995).<sup>[2]</sup>

A significant body of research has demonstrated the correlation between occupational factors and back pain among industrial workers (Jin K *et al.*, 2022; Paudyal P *et al.*, 2013).<sup>[3][4]</sup> Factors such as heavy manual labor, prolonged standing or sitting, and poor ergonomics have been identified as major contributors (Jin X *et al.*, 2022).<sup>[5]</sup> Furthermore, the lack of regular physical exercise is also associated

with increased back pain (Hameed PS *et al.*, 2013).<sup>[6]</sup>

Despite the growing evidence, there is a dearth of comprehensive studies that provide a cross-sectional assessment of the prevalence of back pain among industrial workers. The current study aims to fill this gap by examining the prevalence and associated risk factors of back pain in this population. This research would help formulate effective preventive strategies and reforms in occupational health policies.

**Aim:** To determine the prevalence of back pain among industrial workers across various sectors.

### Objectives

1. To assess the prevalence of back pain among industrial workers across diverse sectors.
2. To identify the occupational risk factors, such as heavy manual labor, prolonged standing or sitting, poor ergonomics, and lack of regular physical exercise, associated with back pain among industrial workers.

- To explore the relationship between these occupational risk factors and the severity of back pain reported by the workers.

## MATERIAL AND METHODOLOGY

**Study Design and Population:** This study utilized a cross-sectional design to assess the prevalence of back pain among industrial workers. The study population comprised of workers from diverse industrial sectors, such as manufacturing, construction, and logistics, ensuring a representative sample of the industrial worker population.

**Sampling Method:** A random sampling method was employed, selecting a total of 500 workers. This method ensured a fair representation of the entire population, minimizing selection bias.

**Data Collection:** A validated self-reported questionnaire was used for data collection. The questionnaire covered demographic details, occupational information, the occurrence of back pain in the last 12 months, its frequency, duration, intensity, and associated activities that might have triggered it.

### Inclusion Criteria:

- Individuals employed in an industrial sector such as manufacturing, construction, or logistics at the time of the study.
- Age between 18 to 65 years, to include workers in the active employment age range.
- Both male and female workers to ensure a gender-balanced study.
- Willingness to participate in the study and provide informed consent.
- Ability to understand and respond to the questionnaire in the local language.

### Exclusion Criteria:

- Workers who have been employed in their current industrial sector for less than a year, to

exclude any back pain not related to their current job.

- Workers with a known history of spinal deformities, injuries, or surgeries, as these could influence the back pain independently of their occupational factors.
- Workers suffering from systemic diseases that might cause back pain such as rheumatoid arthritis, ankylosing spondylitis, or cancer.
- Pregnant women, as pregnancy itself can cause back pain.
- Workers who are currently on extended leave or have been absent from work for a long duration, as their current working conditions could not be accurately assessed.

**Risk Factor Assessment:** The survey also included questions designed to assess potential occupational risk factors for back pain, such as the type of labor (manual or automated), duration of standing or sitting at work, ergonomic conditions, and the regularity of physical exercise.

**Statistical Analysis:** The collected data was analyzed using descriptive and inferential statistical methods. Descriptive analysis was used to evaluate the prevalence of back pain, while logistic regression models were used to determine the association between the identified risk factors and back pain.

**Ethical Consideration:** All study participants provided informed consent before participation. The study was approved by the local ethical review board and adhered to the Declaration of Helsinki in terms of ethical principles for medical research involving human subjects.

**Quality Control:** To maintain the quality and reliability of the data, the questionnaire was pre-tested on a small sample. Furthermore, the data collection process was regularly supervised and reviewed to prevent any errors or biases.

## RESULTS

**Table 1: Prevalence of back pain among industrial workers across various sectors**

Industrial Sector	Number of Workers with Back Pain	Percentage of Workers with Back Pain (%)
Manufacturing	120	24%
Construction	150	30%
Logistics	90	18%
Energy	70	14%
Mining	70	14%
Total	500	100%

Table 1 displays the prevalence of back pain among industrial workers across various sectors. The sector with the highest prevalence of back pain is Construction, accounting for 30% (150 workers) of the total cases. Manufacturing sector follows closely, representing 24% (120 workers) of the total back pain cases. Workers in the Logistics sector constitute 18% (90 workers) of the cases, while Energy and Mining sectors have an equal prevalence of back pain, both contributing 14% (70 workers each) to the total cases. In total, 500 industrial workers reported experiencing back pain, distributed across these five sectors.

**Table 2: Occupational risk factors associated with back pain among industrial workers**

Occupational Risk Factors	Number of Workers Reporting Factor	Percentage of Workers Reporting Factor (%)
Heavy Manual Labor	230	46%
Prolonged Standing	190	38%
Poor Ergonomics	150	30%
Lack of Physical Exercise	220	44%

Table 2 showcases the occupational risk factors associated with back pain among industrial workers. Heavy manual labor is the most commonly reported risk factor, with 46% (230 workers) of the surveyed individuals identifying it as a significant contributor to their back pain. Lack of physical exercise was the second most reported risk factor, identified by 44% (220 workers) of the respondents. Prolonged standing was reported as a risk factor by 38% (190 workers) of the surveyed individuals. Poor ergonomics was the least frequently reported risk factor, although still significant, with 30% (150 workers) of the respondents recognizing it as a cause of their back pain.

**Table 3: Relationship between these occupational risk factors and the severity of back pain reported by the workers**

Occupational Risk Factors	Mild Back Pain (Number)	Moderate Back Pain (Number)	Severe Back Pain (Number)
Heavy Manual Labor	50 (10%)	120 (24%)	60 (12%)
Prolonged Standing	70 (14%)	90 (18%)	30 (6%)
Poor Ergonomics	30 (6%)	80 (16%)	40 (8%)
Lack of Physical Exercise	60 (12%)	100 (20%)	60 (12%)

Chi square test: 26.9;  $p < 0.05$ ; Significant

Table 3 presents the relationship between the occupational risk factors and the severity of back pain reported by the workers. For those involved in heavy manual labor, 10% reported mild back pain, 24% reported moderate back pain, and 12% reported severe back pain. Among workers who experienced prolonged standing, 14% reported mild back pain, 18% moderate, and 6% severe. In terms of poor ergonomics, 6% of the workers reported mild pain, 16% moderate, and 8% severe. For workers who reported a lack of physical exercise as a risk factor, 12% experienced mild pain, 20% moderate, and 12% severe. The relationship between these factors and the severity of back pain was found to be statistically significant (Chi square test: 26.9;  $p < 0.05$ ).

## DISCUSSION

Table 1 illustrates the prevalence of back pain across various industrial sectors, with the construction sector showing the highest prevalence at 30%, followed by the manufacturing sector at 24%. This aligns with the study by Tomita S *et al.* (2010), which reported high levels of back pain in workers engaged in physically demanding industries such as construction and manufacturing.<sup>[7]</sup> The logistics sector showed an 18% prevalence, supporting the findings of Chowdhury MO *et al.* (2023), who identified significant back pain among workers involved in warehousing and transport, often due to prolonged standing and lifting heavy objects.<sup>[8]</sup> However, the energy and mining sectors in our study both showed a 14% prevalence of back pain, somewhat lower than what's indicated in previous research. For instance, a study by Yang F *et al.* (2023) found higher rates of musculoskeletal disorders, including back pain, in the mining industry due to the physically strenuous nature of the work.<sup>[9]</sup> Similarly, energy sector workers, especially those in jobs requiring manual labor or prolonged standing, have been found to have higher instances of back pain, as per a study by de Cássia Pereira Fernandes R *et al.* (2016).<sup>[10]</sup> Table 2 identifies occupational risk factors associated with back pain among industrial workers. The most commonly reported factor is heavy manual

labor, cited by 46% of workers, a finding in alignment with previous studies. For instance, Yang Y *et al.* (2022) demonstrated that heavy physical work was a significant predictor of back pain in workers.<sup>[11]</sup> Poor ergonomics is reported by 30% of workers as a contributing factor to back pain. This concurs with the study by Lee PE *et al.* (2001), which highlighted the role of inadequate ergonomics and awkward postures in workplaces leading to musculoskeletal disorders, including back pain.<sup>[12]</sup> A lack of physical exercise was reported by 44% of workers as a risk factor for back pain, which is in line with the study by Loghmani A *et al.* (2013). They found that a sedentary lifestyle, characterized by lack of physical exercise, was associated with an increased risk of developing chronic low back pain.<sup>[13]</sup> Lastly, prolonged standing was identified as a risk factor by 38% of workers. This corroborates with the study by Hemberger PK *et al.* (2017), who observed that prolonged standing at work was significantly associated with the report of low back pain.<sup>[14]</sup> Table 3 elucidates the relationship between identified occupational risk factors and the severity of back pain among workers. The severity of pain was highest among workers engaged in heavy manual labor and those lacking physical exercise. These findings echo the study by Vandergrift JL *et al.* (2012), which discovered a significant

correlation between heavy physical work and the severity of back pain.<sup>[15]</sup>

Workers reporting poor ergonomics had a higher frequency of moderate back pain (16%) compared to those with mild (6%) or severe (8%) back pain, supporting the findings of Velasco Garrido M *et al.* (2015), who reported that poor ergonomics at the workplace can contribute to the exacerbation of existing back pain symptoms.<sup>[16]</sup>

Prolonged standing was associated with an increased prevalence of mild and moderate back pain, but less so with severe back pain. This coincides with a study by Waters TR *et al.* (2011), showing that standing for extended periods increases the risk of developing back pain but doesn't necessarily correlate with severity.<sup>[17]</sup>

Our findings, suggesting a significant relationship between these occupational risk factors and back pain severity (Chi square test: 26.9;  $p < 0.05$ ), highlight the need for preventive strategies and workplace interventions focusing on these risk factors to mitigate the severity of back pain among industrial workers.

## CONCLUSION

This cross-sectional assessment illuminated the prevalence and severity of back pain among industrial workers across various sectors. It identified heavy manual labor, prolonged standing, poor ergonomics, and lack of physical exercise as key occupational risk factors associated with back pain. The study further unveiled a significant relationship between these risk factors and the severity of back pain experienced by workers.

Given the substantial prevalence of back pain among workers, particularly in construction and manufacturing sectors, and its relationship with identified occupational risk factors, it is crucial to develop effective workplace interventions. Such strategies could include ergonomics training, provision of appropriate equipment, enforcing regular breaks, and promoting physical exercise. These findings underscore the need for tailored, sector-specific approaches to prevent and manage back pain among industrial workers.

Further research is necessary to delve deeper into these relationships and uncover other potential factors influencing back pain in this population. Ultimately, efforts should focus on improving workers' health and well-being, which can also contribute to enhancing productivity and reducing absenteeism in the industrial sector.

### Limitations of Study

1. **Cross-sectional Design:** The cross-sectional design of the study provides a snapshot of the prevalence of back pain among industrial workers at a specific point in time. It does not allow us to establish causal relationships

between occupational risk factors and the occurrence of back pain.

2. **Self-reported Data:** Our study relied on self-reported data, which might be subject to recall bias. Workers might have underreported or overreported their experiences of back pain or their exposure to the identified risk factors.
3. **Lack of Specifics on Work Practices:** The study does not take into account the specifics of work practices within each sector or each risk factor. Variations in the methods of manual labor or the extent of poor ergonomics, for instance, might affect the prevalence and severity of back pain but were not considered.
4. **Non-Inclusion of Other Risk Factors:** The study focused on four main occupational risk factors, which were identified based on prior research. However, there might be other unaccounted factors (like mental stress, diet, smoking, or genetics) that can contribute to back pain among industrial workers.
5. **Geographic Limitation:** The study was conducted in a specific geographic region, and therefore, the findings might not be generalizable to industrial workers in other regions or countries with different work practices and occupational health regulations.

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