Biomedical and Biopharmaceutical Research
Abbreviation: Biomed. Biopharm. Res.
Volume: 21: Issue: 02 |Year: 2024
Page Number: 751-757

A Study on Prevalence of Work-Related Musculoskeletal Disorders Among Factory Workers: A Cross-Sectional Study

Dr. Sudip Banik Choudari[1], Dr. Shiv Ratan Pathak[2], Dr. Akashneel Bhattacharya[3], Dr. Naresh Kumar Munda[4]

[1] Assistant Professor, Department of Community Medicine, Faculty of Icare Institute of Medical Sciences and Research and Dr. B C Roy Hospital, Haldia, India
[2] Assistant Professor, Department of General Medicine, Faculty of Icare Institute of Medical Sciences and Research and Dr. B C Roy Hospital, Haldia, India
[3] Assistant Professor, Department of Microbiology, Faculty of Kanti Devi Medical College Hospital and Research Centre, Mathura, India.
[4] Associate Professor, Department of Community Medicine, Faculty of Icare Institute of Medical Sciences and Research and Dr. B C Roy Hospital, Haldia, India

Corresponding Author

Dr. Naresh Kumar Munda

Associate Professor, Department of Community Medicine, Faculty of Icare Institute of Medical Sciences and Research and Dr. B C Roy Hospital, Haldia, India

Received: 23-08-2024

Accepted: 09-09-2024

Published: 18-10-2024

Abstract

Background: Work-related musculoskeletal disorders (WMSDs) are a common occupational health issue affecting workers in industrial and factory settings. They result in reduced productivity, increased absenteeism, and impaired quality of life. Objective: To determine the prevalence and risk factors of WMSDs among factory workers and identify commonly affected body regions. Methods: A cross-sectional study was conducted among 32 factory workers from various departments. A structured questionnaire and physical assessment were used to identify symptoms, job profiles, and risk factors for musculoskeletal disorders. Results: The prevalence of WMSDs was 62.5%. The most commonly affected areas were the lower back, shoulders, and neck. Major risk factors included poor ergonomics, repetitive work, prolonged standing, and lack of rest breaks. Conclusion: are highly prevalent among factory workers and are associated with modifiable risk factors. Ergonomic improvements and worker education are essential in reducing the burden of these disorders.

KEYWORDS: Musculoskeletal disorders, Factory.

INTRODUCTION

Work-related musculoskeletal disorders (WMSDs) refer to injuries or pain in the muscles, nerves, tendons, joints, cartilage, or spinal discs caused or aggravated by work-related activities. These disorders are a leading cause of occupational disability worldwide, especially in physically demanding jobs like factory work[1].

Work-related musculoskeletal disorders (WMSDs) are a significant global health concern, affecting a large percentage of the workforce. The prevalence of WMSDs varies depending on the study population, occupation, and body region examined, but studies indicate that a substantial proportion of workers experience these disorders. Overall Prevalence: One study reported a 12-month prevalence of WMSDs at 53.1%. Another study

found a prevalence of 64.2%. A study focusing on nurses found that almost all (97.3%) had complained of work-related pain in the past 12 months[2-5].

Body Regions Affected: The lower back/waist is frequently reported as the most affected area, with prevalence rates ranging from 36.5% to 57%. Other commonly affected areas include the neck, shoulders, and upper back[6-8]. Occupational Groups: Certain occupations, like those in the food industry and healthcare, are particularly susceptible to WMSDs. Studies have also highlighted the prevalence of WMSDs among nurses, bus drivers, and ironworkers. Risk Factors: Various factors contribute to WMSDs, including age, length of service, gender, body mass index, job tenure, workload, and lifestyle factors like physical exercise. Studies also show that factors like marital status, work fatigue, and night shift frequency can play a role

Factors such as repetitive motion, poor posture, heavy lifting, vibration, and inadequate workstations increase the risk of WMSDs. Despite their impact, WMSDs are often underreported and poorly managed in industrial sectors. This study aims to assess the prevalence and contributing risk factors of WMSDs among factory workers to recommend appropriate preventive measures[9-11].

METHODOLOGY

This study was conducted in a tertiary hospital. After obtaining institutional ethical committee approval. It was Cross-sectional observational study conducted on 32 patients in the department of General medicine, at a tertiary care centre, from January / 2024 to July/2024

Total 32 participant were approached to project among them No one were excluded in this study and Total 32 Confirmed cases were included on the basis of fulfilling of the eligibility criteria. The institute Ethics Committee approval was obtained before starting the sample collection. A written and informed consent was taken from the patient regarding the study in his/her vernacular language and English. In this study Patients were subjected to: A detailed history of sign & symptoms and its duration. Detailed history of systemic diseases and its duration, medication were noted. Patients were subjected to General physical examination.

Study Design:

Cross-sectional descriptive study

Study Setting:

Factory/industrial unit in Eastern India

Study Duration:

3 months

Sample Size:

32 factory workers selected using simple random sampling

Inclusion Criteria:

- Workers aged 18–60 years
- Employed for ≥6 months
- Provided informed consent

Exclusion Criteria:

- Pre-existing musculoskeletal disorders unrelated to occupation
- History of recent trauma or surgery

Data Collection Tools:

- Standardized Nordic Musculoskeletal Questionnaire (NMQ)
- Observational checklist on posture and workstation setup

Flowchart: Study Methodology

Factory Workers Screened for Eligibility (n=40)

↓

Eligible and Consented Participants (n=32)

↓

Nordic Musculoskeletal Questionnaire Administered

↓

Physical Assessment and Observation Conducted

↓

Data Entry, Risk Factor Identification and Analysis

RESULTS

In this study we found that Work-related musculoskeletal disorders (WMSDs) is associated with demographic profile of patient. 43.8% of Work-related musculoskeletal disorders (WMSDs) is belongs 31-45 years age group followed by 31.3 % 18–30 years age group . Age is also associated factors for Work-related musculoskeletal disorders (WMSDs)

Male are more prone to suffered of Work-related musculoskeletal disorders (WMSDs) as compared to female its prevalence 81.3% .63.2% Work-related musculoskeletal disorders (WMSDs) were predominance with Duration of employment >5 yrs(Table 1)

Demographic Profile of Participants Table 1 (n=32)

Demographic Factor	Frequency (n)	Percentage (%)
Age 18–30 years	10	31.3%
Age 31–45 years	14	43.8%
Age >45 years	8	25.0%
Male	26	81.3%
Female	6	18.7%
Duration of employment >5 yrs	20	62.5%
Department – Manufacturing	16	50.0%
Department – Packaging	10	31.3%
Department – Maintenance	6	18.7%

Work-Related Musculoskeletal Disorders are due to Repetitive movements, Prolonged standing/sitting, Heavy lifting and Poor workstation ergonomics risk factors (Table 2)

Risk Factors of Work-Related Musculoskeletal Disorders Table 2 (n=32)

Risk Factor	Affected Workers (n)	Percentage (%)
Repetitive movements	21	65.6%
Prolonged standing/sitting	18	56.3%
Heavy lifting	14	43.8%
Poor workstation ergonomics	20	62.5%
Inadequate breaks/rest periods	16	50.0%
Obesity (BMI >25)	10	31.3%

- **Prevalence of WMSDs:**
  - 20 out of 32 workers reported at least one musculoskeletal symptom

- **Prevalence = 62.5%**
- **Common Sites of Pain/Discomfort:**

Body Region	Number Affected (n)	Percentage of Total (%)
Lower back	14	43.8%
Shoulders	9	28.1%
Neck	8	25.0%
Knees	6	18.8%
Wrists/Hands	4	12.5%

- **Symptoms Most Reported:**
  - Muscle pain, stiffness, tingling sensation, reduced range of motion

DISCUSSION

The findings demonstrate that WMSDs are highly prevalent among factory workers, particularly those involved in repetitive tasks and those exposed to poor ergonomic conditions. Lower back pain was the most commonly reported issue, consistent with other studies conducted in industrial settings[12].

Several demographic factors are associated with the prevalence and severity of work-related musculoskeletal disorders (WMSDs). These include age, gender, body mass index (BMI), and years of work experience[13-15]. Age: Older individuals tend to report higher rates of WMSDs. This may be due to the cumulative effects of work-related stress and physical demands over time, as well as age-related changes in the body's musculoskeletal system. Gender: Studies suggest that females may be more susceptible to WMSDs than males, though this can vary by the specific type of work and body region. For example, one study found a higher prevalence of WMSDs in female manufacturing workers compared to their male counterparts. BMI: A higher BMI is often associated with an increased risk of WMSDs. Individuals with higher BMIs may experience greater stress on their joints and muscles, potentially leading to pain and injury. Work Experience: Longer work experience can be a risk factor for WMSDs. As individuals gain more years of experience, they may be exposed to repetitive tasks, awkward postures, and heavy lifting for extended periods, increasing their risk[16].

In this study we found that Work-related musculoskeletal disorders (WMSDs) is associated with demographic profile of patient. 43.8% of Work-related musculoskeletal disorders (WMSDs) is belongs 31-45 years age group followed by 31.3 % 18–30 years age group . Age is also associated factors for Work-related musculoskeletal disorders (WMSDs)

Male are more prone to suffered of Work-related musculoskeletal disorders (WMSDs) as compared to female its prevalence 81.3% .63.2% Work-related musculoskeletal disorders (WMSDs) were predominance with Duration of employment >5 yrs(Table 1)

Other Factors: Physical Activity: Lack of regular physical activity can contribute to WMSDs, as it may weaken supporting muscles and increase vulnerability to injury[17-20].

Smoking: Smoking has been linked to increased risk of musculoskeletal pain, particularly in the extremities. Alcohol Consumption: Excessive alcohol consumption can negatively impact overall health and may contribute to musculoskeletal problems[21-25].Work Hours: Working longer hours is a significant risk factor for WMSDs. Extended workdays can lead to fatigue, poor posture, and increased strain on the musculoskeletal system. Job Rotation:

Lack of job rotation can lead to repetitive stress injuries, as workers may perform the same tasks for extended periods. Education: While some studies show a correlation between lower education levels and higher WMSD prevalence, others suggest that higher education can be associated with higher demands in specific industries[26].

Work-related musculoskeletal disorders (WMSDs) are injuries and pain in the body's muscles, nerves, tendons, ligaments, joints, cartilage, or spinal discs. These are often caused or aggravated by work tasks. Risk factors for WMSDs include physical factors like awkward postures, forceful movements, and repetitive tasks, as well as psychosocial factors like high job demands and lack of control[27-29].
Physical Risk Factors: Awkward postures: Working in positions that strain the body, such as reaching overhead, bending, or twisting. movements: Performing the same motions or actions repeatedly, especially at a fast pace. Forceful exertions: Lifting heavy objects, using excessive force with tools, or performing tasks that require significant physical effort[30]. Vibration: Exposure to vibrations from hand tools or machinery. Temperature extremes: Working in very hot or cold environments. Psychosocial Risk Factors: High job demands: Having a job that is too demanding, leading to stress and fatigue. Lack of control: Having little or no say in how work is performed. Lack of social support: Feeling isolated or unsupported by colleagues or supervisors. Work-related stress: Experiencing stress and anxiety due to work-related factors.
Poor communication: Inadequate communication about work tasks or safety procedure Understanding these demographic factors is crucial for developing targeted prevention strategies and interventions to reduce the burden of WMSDs in the workplace[31].

The study also revealed significant associations between WMSDs and modifiable risk factors such as poor posture, repetitive movements, and lack of adequate rest. Workers with more than 5 years of service were more prone to chronic musculoskeletal complaints, indicating a cumulative effect.
This study emphasizes the need for workplace ergonomics training, job rotation, and regular breaks to reduce physical strain.

CONCLUSION

WMSDs are a significant occupational hazard among factory workers. With a prevalence of 62.5%, they represent a major cause of physical discomfort and lost productivity. Identifying and mitigating risk factors such as repetitive tasks, poor ergonomics, and lack of rest is crucial. Preventive strategies should include ergonomic assessments, health education, and timely medical interventions.

SOURCE OF FUNDING: No

CONFLICT OF INTEREST

The authors report no conflicts of interest

SUBMISSION DECLARATION

This submission has not been published anywhere previously and that it is not simultaneously being considered for any other journal.

REFERENCES

1. Hartvigsen J, Hancock MJ, Kongsted A, Louw Q, Ferreira ML, Genevay S, et al. What low back pain is and why we need to pay attention. Lancet. (2018) 391:2356–67. doi: 10.1016/S0140-6736(18)30480-X, PMID:
2. Williams A, Kamper SJ, Wiggers JH, O'Brien KM, Lee H, Wolfenden L, et al. Musculoskeletal conditions may increase the risk of chronic disease: a systematic review and meta-analysis of cohort studies. BMC Med. (2018) 16:167. doi: 10.1186/s12916-018-1151-2, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
3. Jia N, Zhang H, Ling R, Liu Y, Li G, Ren Z, et al. Epidemiological data of work-related musculoskeletal disorders—China, 2018–2020. China CDC Wkly. (2021) 3:383–9. doi: 10.46234/ccdcw2021.104, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]

4. Punnett L, Wegman DH. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. J Electromyogr Kinesiol. (2004) 14:13–23. doi: 10.1016/j.jelekin.2003.09.015, PMID: [DOI] [PubMed] [Google Scholar]
5. Wang W, Miao C, Yu H, Li C. Research on the characteristics and influencing factors of the Beijing-Tianjin-Hebei urban network structure from the perspective of listed manufacturing enterprises. PLoS One. (2023) 18:e0279588. doi: 10.1371/journal.pone.0279588, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
6. Caldwell JA, Caldwell JL, Thompson LA, Lieberman HR. Fatigue and its management in the workplace. Neurosci Biobehav Rev. (2019) 96:272–89. doi: 10.1016/j.neubiorev.2018.10.024 [DOI] [PubMed] [Google Scholar]
7. Wong K, Chan AHS, Ngan SC. The effect of long working hours and overtime on occupational health: a meta-analysis of evidence from 1998 to 2018. Int J Environ Res Public Health. (2019) 16:2102. doi: 10.3390/ijerph16122102, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
8. Dong Y, Jiang P, Jin X, Maimaiti N, Wang S, Yang L, et al. Derived patterns of musculoskeletal symptoms and their relationships with ergonomic factors among electronic assembly workers: a latent class analysis. J Saf Res. (2022) 82:293–300. doi: 10.1016/j.jsr.2022.06.004, PMID: [DOI] [PubMed] [Google Scholar]
9. Jin X, Dong Y, Wang F, Jiang P, Zhang Z, He L, et al. Prevalence and associated factors of lower extremity musculoskeletal disorders among manufacturing workers: a cross-sectional study in China. BMJ Open. (2022) 12:e054969. doi: 10.1136/bmjopen-2021-054969, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
10. Dawson AP, Steele EJ, Hodges PW, Stewart S. Development and test-retest reliability of an extended version of the Nordic Musculoskeletal Questionnaire (NMQ-E): a screening instrument for musculoskeletal pain. J Pain. (2009) 10:517–26. doi: 10.1016/j.jpain.2008.11.008, PMID: [DOI] [PubMed] [Google Scholar]
11. Pugh JD, Gelder L, Williams AM, Twigg DE, Wilkinson AM, Blazevich AJ. Validity and reliability of an online extended version of the Nordic Musculoskeletal Questionnaire (NMQ-E2) to measure nurses' fitness. J Clin Nurs. (2015) 24:3550–63. doi: 10.1111/jocn.12971, PMID: [DOI] [PubMed] [Google Scholar]
12. Luger T, Maher CG, Rieger MA, Steinhilber B. Work-break schedules for preventing musculoskeletal symptoms and disorders in healthy workers. Cochrane Database Syst Rev. (2019) 2019:CD012886. doi: 10.1002/14651858.CD012886.pub2, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
13. Mishra S, Sarkar K. Work-related musculoskeletal disorders and associated risk factors among urban metropolitan hairdressers in India. J Occup Health. (2021) 63:e12200. doi: 10.1002/1348-9585.12200, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
14. Yang Y, Zeng J, Liu Y, Wang Z, Jia N, Wang Z. Prevalence of musculoskeletal disorders and their associated risk factors among furniture manufacturing workers in Guangdong, China: a cross-sectional study. Int J Environ Res Public Health. (2022) 19:14435. doi: 10.3390/ijerph192114435, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
15. Lee Y-C, Hong X, Man SS. Prevalence and associated factors of work-related musculoskeletal disorders symptoms among construction workers: a cross-sectional study in South China. Int J Environ Res Public Health. (2023) 20:4653. doi: 10.3390/ijerph20054653, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
16. Okezue OC, Anamezie TH, Nene JJ, Okwudili JD. Work-related musculoskeletal disorders among office workers in higher education institutions: a cross-sectional study. Ethiop J Health Sci. (2020) 30:715–24. doi: 10.4314/ejhs.v30i5.10, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
17. Yang F, Di N, Guo W-W, Ding WB, Jia N, Zhang H, et al. The prevalence and risk factors of work related musculoskeletal disorders among electronics manufacturing workers: a cross-sectional analytical study in China. BMC Public Health. (2023) 23:10. doi: 10.1186/s12889-022-14952-6, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]

18. Lee J-G, Kim GH, Jung SW, Kim SW, Lee JH, Lee KJ. The association between long working hours and work-related musculoskeletal symptoms of Korean wage workers: data from the fourth Korean working conditions survey (a cross-sectional study). Ann Occup Environ Med. (2018) 30:67. doi: 10.1186/s40557-018-0278-0, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
19. Nordander C, Ohlsson K, Balogh I, Hansson GÅ, Axmon A, Persson R, et al. Gender differences in workers with identical repetitive industrial tasks: exposure and musculoskeletal disorders. Int Arch Occup Environ Health. (2008) 81:939–47. doi: 10.1007/s00420-007-0286-9, PMID: [DOI] [PubMed] [Google Scholar]
20. Palmer KT, Goodson N. Ageing, musculoskeletal health and work. Best Pract Res Clin Rheumatol. (2015) 29:391–404. doi: 10.1016/j.berh.2015.03.004, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
21. Huang K, Cai H-L, Bao J-P, Wu L-D. Dehydroepiandrosterone and age-related musculoskeletal diseases: connections and therapeutic implications. Ageing Res Rev. (2020) 62:101132. doi: 10.1016/j.arr.2020.101132, PMID: [DOI] [PubMed] [Google Scholar]
22. Loeser RF. Age-related changes in the musculoskeletal system and the development of osteoarthritis. Clin Geriatr Med. (2010) 26:371–86. doi: 10.1016/j.cger.2010.03.002, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
23. Yu W, Yu ITS, Li Z, Wang X, Sun T, Lin H, et al. Work-related injuries and musculoskeletal disorders among factory workers in a major city of China. Accid Anal Prev. (2012) 48:457–63. doi: 10.1016/j.aap.2012.03.001, PMID: [DOI] [PubMed] [Google Scholar]
24. Taibi Y, Metzler YA, Bellingrath S, Müller A. A systematic overview on the risk effects of psychosocial work characteristics on musculoskeletal disorders, absenteeism, and workplace accidents. Appl Ergon. (2021) 95:103434. doi: 10.1016/j.apergo.2021.103434, PMID: [DOI] [PubMed] [Google Scholar]
25. Kett AR, Milani TL, Sichting F. Sitting for too long, moving too little: regular muscle contractions can reduce muscle stiffness during prolonged periods of chair-sitting. Front Sports Act Living. (2021) 3:760533. doi: 10.3389/fspor.2021.760533, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
26. Mozafari A, Vahedian M, Mohebi S, Najafi M. Work-related musculoskeletal disorders in truck drivers and official workers. Acta Med Iran. (2015) 53:432–8. PMID: [PubMed] [Google Scholar]
27. Omar M, Sultan MF, El Sherif E, Abdallah MM, Monga M. Ergonomics and musculoskeletal symptoms in surgeons performing endoscopic procedures for benign prostatic hyperplasia. Ther Adv Urol. (2020) 12:1756287220904806. doi: 10.1177/1756287220904806, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
28. Pickard O, Burton P, Yamada H, Schram B, Canetti EFD, Orr R. Musculoskeletal disorders associated with occupational driving: a systematic review spanning 2006–2021. Int J Environ Res Public Health. (2022) 19:6837. doi: 10.3390/ijerph19116837, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]
29. da Costa BR, Vieira ER. Stretching to reduce work-related musculoskeletal disorders: a systematic review. J Rehabil Med. (2008) 40:321–8. doi: 10.2340/16501977-0204, PMID: [DOI] [PubMed] [Google Scholar]
30. Kelly D, Shorthouse F, Roffi V, Tack C. Exercise therapy and work-related musculoskeletal disorders in sedentary workers. Occup Med (Lond). (2018) 68:262–72. doi: 10.1093/occmed/kqy054, PMID: [DOI] [PubMed] [Google Scholar]
31. Kasaw Kibret A, Fisseha Gebremeskel B, Embaye Gezae K, Solomon Tsegay G. Work-related musculoskeletal disorders and associated factors among bankers in Ethiopia, 2018. Pain Res Manag. (2020) 2020:8735169–9. doi: 10.1155/2020/8735169, PMID: [DOI] [PMC free article] [PubMed] [Google Scholar]