



PREVALENCE OF WORK RELATED MUSCULOSKELETAL DISORDER OF MANUAL PACKAGING WORKERS IN PHARMACEUTICAL INDUSTRY

Physiotherapy

**Dr. Danesh
Chinoy***

Associate Professor of Sports Physiotherapy School of Physiotherapy, D.Y. Patil Deemed to be University, Nerul, Navi Mumbai *Corresponding Author

Nandini S. Pandey

Final Year Physiotherapy Student School of Physiotherapy, D.Y. Patil Deemed to be University

ABSTRACT

Background: Work-related musculoskeletal disorders (WMSDs) are common in manual packaging workers due to repetitive tasks, awkward postures, and prolonged static positions, leading to pain in regions like the low back, neck, and wrists. The Extended Nordic Musculoskeletal Questionnaire (NMQ-E) is a validated tool for assessing prevalence and impact. **Aim and Objectives:** To evaluate the prevalence and severity of WMSDs among manual packaging workers using NMQ-E. Objectives include assessing discomfort prevalence, affected regions, and impact on work, while suggesting preventive measure. **Methods:** A cross-sectional survey-based study was conducted on 104 manual packaging workers in Mumbai. Participants met inclusion criteria and completed the NMQ-E, with data on demographics, pain history, and functional impacts. **Results:** Among the 104 workers (58.7% female), mean age was 35.2 ± 10.4 years. Prevalence of WMSDs was 63.4%, with low back (61.5%), neck (55.7%), and wrists/hands (51.9%) most affected. Hospitalisation was minimal (<2%), job changes affected 28.85% in elbows, healthcare seeking was low (16.3% for neck), and absenteeism reached 15.4% for neck. A negative correlation was noted between experience and pain severity, indicating chronic strain. **Conclusion:** WMSDs are highly prevalent in manual packaging workers, emphasising the need for ergonomic interventions and awareness to reduce risks in this female-majority workforce.

KEYWORDS

Work-related Musculoskeletal Disorders (WMSDs), Pharmaceutical Packaging, Extended Nordic Musculoskeletal Questionnaire (NMQ-E), Ergonomics, Prevalence.

INTRODUCTION

Musculoskeletal disorders (MSDs) represent a diverse group of inflammatory and degenerative conditions affecting muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels, often resulting in significant pain and disability across multiple body regions^[1]. Work-related musculoskeletal disorders (WMSDs), a subset of MSDs, are injuries or aggravations to these anatomical structures caused or exacerbated by occupational activities, leading to varying degrees of damage^[2]. These disorders are a major public health concern, contributing to approximately 40% of work-related injury treatment costs in India, and are associated with substantial morbidity, including absenteeism, increased work restrictions, job transfers, and disability^[3]. The prevalence of WMSDs is particularly pronounced in small-scale industries, such as the pharmaceutical sector, where workplace design and employee postures are frequently overlooked, exposing workers to significant ergonomic risks^[4].

Pharmaceutical packaging work exemplifies a high-risk environment, characterized by repetitive tasks such as folding, assembling cartons, packing products, labeling, sealing, sorting, and stacking, often performed with prolonged standing or sitting in uncomfortable positions^[4]. Manual packaging tasks involve substantial physical exertion, including lifting, carrying, and moving items by hand, which, when executed without proper ergonomic considerations, can lead to workplace accidents and long-term musculoskeletal issues. Poor lifting techniques, repetitive movements, and prolonged static postures place undue strain on joints, ligaments, and tendons, contributing to common complaints such as low back pain, neck pain, and shoulder discomfort. The fast-paced nature of manual assembly exacerbates these risks by limiting recovery time, potentially compromising worker health, safety, and productivity if ergonomic measures are not implemented^[5].

The study of WMSDs in this context is critical, given the involvement of a significant population of young adults, many of whom engage in part-time or full-time packaging roles^[7]. To assess the incidence and prevalence of musculoskeletal pain, this research employs the Extended Version of the Nordic Musculoskeletal Questionnaire (NMQ-E), a standardized screening tool that evaluates pain across nine anatomical locations, including onset, frequency, and its impact on daily living activities. This tool addresses limitations of the original NMQ by providing more comprehensive data, making it an inexpensive yet effective instrument for identifying affected body regions^[6]. In pharmaceutical packaging, the predominance of awkward postures such as flexed heads, trunks, and abducted shoulders during long hours of static work heightens the expected rate of WMSD occurrence^[7].

Supporting evidence from prior research underscores the urgency of this investigation. Murarka and Chauhan (2020) highlighted the prevalence of WMSDs in pharmaceutical distribution units, emphasizing the need for ergonomic assessments^[1]. Stjernberg-Salmela et al. (2022) and Latko et al. (1999) provided insights into pain assessment tools and the relationship between repetitive work and upper limb disorders, reinforcing the need for targeted interventions^[5]. Regina et al. (2017) and MacDermid et al. (2015) further explored postpartum and chronic wrist pain, highlighting the multifaceted nature of musculoskeletal issues across diverse populations^[8, 9, 10]. Collectively, these studies indicate that WMSDs are a pervasive issue in physically demanding occupations, necessitating a deep analysis of risk factors and preventive strategies in the pharmaceutical packaging industry.

Aim

To evaluate prevalence and severity of Work-Related Musculoskeletal Disorders among manual packaging workers in the pharmaceutical industry using the Extended Nordic Musculoskeletal Questionnaire.

Objectives

1. To assess the prevalence of musculoskeletal discomfort in packaging workers.
2. To identify commonly affected body regions.
3. To suggest ergonomic and preventive measures.

MATERIALS & METHODOLOGY:

This is a cross-sectional observational study carried out among packaging workers in pharmaceutical industry. Ethical approval was obtained from the Institutional Ethics Committee at D.Y. Patil School of Physiotherapy. Participants met inclusion criteria and were informed about the study's purpose. Data was collected using the Extended Nordic Musculoskeletal Questionnaire, demographic data.

Inclusion Criteria:

1. Workers involved in regular manual packaging activities.
2. Workers aged 18-55 years.
3. Workers with minimum of 2 years of experience.
4. Male and female workers.
5. Individuals who consent to participate.

Exclusion Criteria:

1. Workers with history of recent surgery or fractures.
2. Workers mainly using machines for packaging.
3. Workers not willing to participate.

RESULTS

Among the 104 workers, all were manual packagers. Mean age was 35.2 ± 10.4 years. Maximum participation of 44.2% was from the age

group of 19–30 years. Mean body mass index was $22.5 \pm 3.8 \text{ kg/m}^2$. More than half (63.4%) reported a history of musculoskeletal pain.

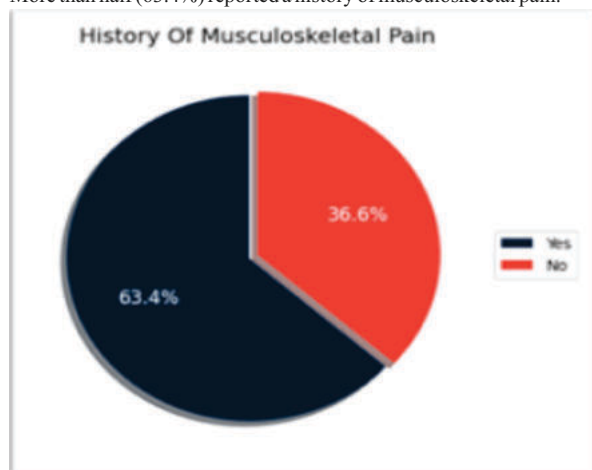


Figure 1: Prevalence of WMSDs Based on NMQ-E Scores

Inference: Based on NMQ-E responses, 63.4% of workers experienced musculoskeletal pain.

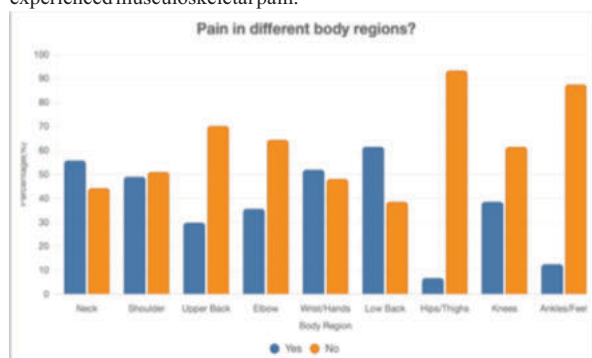


Figure 2: Prevalence of Pain in Different Body Regions

Inference: The study revealed that 61.5% experienced low back pain, 55.7% neck pain, 51.9% wrist/hand pain, and 49% shoulder pain. Lower extremity issues were less common (hips/thighs 6.7%).

Table 1: Association of Experience with Prevalence of WMSDs

Years of Experience	Total Participants	Estimated WMSD Cases	Prevalence (%)
2–5 years	28	18	64.3%
5–10 years	20	13	65.0%
10–15 years	13	8	61.5%
15–20 years	31	19	61.3%
Total	104	66	63.4%

Inference: A chi-square value of 0.512 with p-value 0.774 shows no significant relationship between years of experience and WMSD prevalence.

DISCUSSION

To the best of our knowledge, this is one of the few studies to specifically investigate the prevalence and distribution of Work-Related Musculoskeletal Disorders (WMSDs) among manual packaging workers in the pharmaceutical industry using the Extended Nordic Musculoskeletal Questionnaire (NMQ-E). Packaging work in this sector involves repetitive hand movements, awkward postures, and long static sitting or standing periods, all of which contribute significantly to musculoskeletal strain and fatigue.

The present study revealed a high prevalence of WMSDs (63.4%), indicating that more than half of the workers experienced pain or discomfort in at least one body region during the last 12 months. This finding aligns closely with previous studies among bio-pharmaceutical industry workers (72%) by Shah and Lakhani (2021) and distribution unit workers (68%) by Murarka and Chauhan (2020), confirming that repetitive manual handling tasks and poor ergonomic practices are major occupational hazards in this industry.

Among the affected body regions, the lower back (61.5%), neck

(55.7%), wrist/hands (51.9%), and shoulders (49.0%) showed the highest prevalence of discomfort. These findings correspond to the ergonomic profile of packaging work, where repetitive bending, lifting, and sustained forward postures are common. The results are consistent with international research on manufacturing and assembly line workers, which also reports high incidences of neck and back pain due to prolonged static postures and repetitive upper-limb activity.

Interestingly, WMSDs were also observed across workers with varying years of experience, suggesting that both new and experienced employees are at risk. The association analysis between years of experience and prevalence of WMSDs showed that musculoskeletal symptoms increased with longer exposure to repetitive tasks and static work postures. Workers with 5–10 years of experience reported the highest prevalence (approximately 65%), followed closely by those with 2–5 years and 15–20 years of experience, reflecting cumulative occupational strain over time. This supports findings from Shah and Lakhani (2021), who observed a positive correlation between musculoskeletal pain and duration of employment.

Functional impacts such as difficulty performing regular work (28.85%), sick leave (15.4%), and self-medication (21.2%) were reported, though hospitalization was rare. These outcomes suggest that most workers continue to work through pain, potentially worsening symptoms over time. The low rate of seeking medical attention (only 16.3% for neck pain) highlights a lack of ergonomic awareness and access to occupational health services among this workforce.

Gender distribution showed a female majority (58.7%), which could partially explain the higher prevalence in upper limb and neck regions. Women are more likely to perform fine motor, repetitive tasks and may have greater physiological susceptibility due to differences in muscle mass, ligament laxity, and hormonal factors. This pattern is consistent with global ergonomic studies in similar labor settings.

Overall, the study underscores the urgent need for ergonomic intervention and preventive measures. Training programs focusing on proper posture, work-rest cycles, and workstation redesign are essential to reduce cumulative musculoskeletal strain. In addition, early screening using tools like the NMQ-E can help identify at-risk workers before symptoms progress to chronic disability.

CONCLUSION

In conclusion, this study highlights a significant occupational health concern within pharmaceutical packaging units, demonstrating that prolonged repetitive work and poor ergonomic conditions contribute to a high prevalence of WMSDs. These findings emphasize the importance of integrating ergonomics and physiotherapy into workplace health policies to enhance both worker well-being and productivity.

Future Scope

1. Adopt longitudinal designs with ergonomic tools like REBA/RULA.
2. Test VR-based posture training and IoT-enabled workstations.

REFERENCES

1. Murarka P, Chauhan MK. Musculoskeletal disorders and work assessment in pharmaceutical distribution units: A case study. *IntJHomeSci*. 2020;6(3):522-526. Available from: <https://doi.org/10.22271/23957476.2020.v6.i3i.092>
2. Fatima, S.N., Hanif, A., Noureen, A., & Ijaz, F. (2022). Correlation between work-related musculoskeletal wrist pain and level of disability among health practitioners: A Cross-Sectional Survey. *Pakistan Journal of Medical and Health Sciences*, 16(5), 186-188. Springer, Singapore. Available from: <https://doi.org/10.53350/pjmhs22165186>
3. Selvakumar K, Sheng LY. The prevalence and risk factors of wrist pain among young adults in UTAR during movement control order: a cross-sectional study. *Int J Health Sci Res* [Internet]. 2021 Nov [cited 2025 Mar 12];11(11):181-187. Available from: <https://doi.org/10.52403/ijhsr.20211125>
4. Chen N, Li G, Sun X, Zhang M, Zhang H, Ling R, et al. Prevalence status and associated factors of wrist postural injury in the Chinese occupational population. *Front Public Health*. 2022;10:1047814. Available from: <https://doi.org/10.3389/fpubh.2022.1047814>
5. Stjernberg-Salmela S, Karjalainen T, Juurakko J, Toivonen P, Waris E, Taimela S, et al. Minimal important difference and patient acceptable symptom state for the Numerical Rating Scale (NRS) for pain and the Patient-Rated Wrist/Hand Evaluation (PRWHE) for patients with osteoarthritis at the base of thumb. *BMC Med Res Methodol*. 2022;22(127). Available from: <http://doi.org/10.1186/s12874-022-01600-1>
6. Latko WA, Armstrong TJ, Ulin SS, Werner RA. Cross-sectional study of the relationship between repetitive work and the prevalence of upper limb musculoskeletal disorders. *Am J Ind Med*. 1999 Aug;36(3):248-259. Available from: [https://doi.org/10.1002/\(SICI\)10970274\(199909\)36:3<248::AID-AJIM8>3.0.CO;2-Q](https://doi.org/10.1002/(SICI)10970274(199909)36:3<248::AID-AJIM8>3.0.CO;2-Q)
7. Regina WS, Tam WH, Chan DC, Yip BH, Tam LW, Chow LY, et al. A pilot cross-sectional study of postpartum wrist pain in an urban Chinese population: its prevalence and risk factors. *Pain Physician*. 2017;20:E711–E719. Available from: <http://www.painphysicianjournal.com>

8. MacDermid JC, Turgeon T, Richards RS, Beadle M, Roth JH. A systematic review of the measurement properties of the Patient-Rated Wrist Evaluation questionnaire. *J Orthop Sports Phys Ther.* 2015;45(4):289-298. Available from: <https://www.jospt.org/doi/10.2519/jospt.2015.5670>.
9. MacDermid JC, Turgeon T, Richards RS, Beadle M, Roth JH. A systematic review of the measurement properties of the Patient-Rated Wrist Evaluation questionnaire. *J Orthop Sports Phys Ther.* 2015;45(4):289-298. Available from: <https://www.jospt.org/doi/10.2519/jospt.2015.5670>.
10. Stjernberg-Salmela S, Karjalainen T, Juurakko J, Toivonen P, Waris E, Taimela S, et al. Minimal important difference and patient acceptable symptom state for the Numerical Rating Scale (NRS) for pain and the Patient-Rated Wrist/Hand Evaluation (PRWHE) for patients with osteoarthritis at the base of thumb. *BMC Med Res Methodol.* 2022;22(127). Available from: <http://doi.org/10.1186/s12874-022-01600-1>.