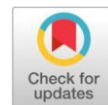


Review Article

Open Access

A Review on Developing MSDs (*Musculoskeletal Disorders*) at the workplace of jewellery manufactures


 Thodeti Manasa^{ID} and Hemu Rathore^{ID}

Department of RMCS, CCAS, MPUAT, Udaipur, Rajasthan, India

ABSTRACT

Musculoskeletal disorders (MSDs) are injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and supporting structures of the upper and lower limbs, neck, and lower back that are caused, precipitated or exacerbated by sudden exertion or prolonged exposure to physical factors such as repetition, force, vibration, or awkward posture. The jewellery manufacturing process involves designing, casting, model making, setting (metal and stone), finishing and polishing. At every step, this process requires higher concentration and quality checking, as any mistake at any step involves expensive metal loss. Like any craft-based job, jewellery manufacturing also requires long hours of work exposure, awkward posture and repetitive movements. By reviewing many articles, it is evident that mitigating these hazards requires implementing ergonomic measures such as flexible workstations, adequate seating, and encouraging regular stretching and movement breaks. Education on posture, body mechanics, and the significance of tool design in reducing strain can also help prevent injury. Additionally, the use of ergonomic tools and equipment, such as specially designed chairs, magnification devices, and proper lighting, can further reduce strain on workers. Implementing job rotation strategies and scheduling adequate rest periods can also help minimize fatigue and overuse injuries. Furthermore, fostering a workplace culture that prioritizes health and safety can encourage workers to adopt best practices, ultimately enhancing productivity and well-being in the jewellery manufacturing industry.

Keywords: Musculoskeletal disorders, Occupational health hazards, Repetitive motions, uncomfortable postures, Jewellery manufacturers and Discomforts.

Introduction

One of the sectors in the nation with the quickest rate of growth right now is the jewellery industry. It is a major source of foreign exchange earnings and holds a significant place in the Indian economy. The majority of the world's 52% jewellery consumption occurs in India. With its contribution of gold jewellery, cut and polished diamonds, pearls, colored gemstones, non-gold jewellery, and fashion jewellery, India supplies nearly half of the global market. One of the oldest industrial processes in the world, jewellery creation has always required certain risky procedures. The activities involve precise design, placing small metals and stones, and are frequently near-point tasks that need a high level of visual attention and mental concentration.

It requires extended periods of sitting in the same position and is sedentary. Several studies have been conducted that indicate the presence of risk factors for MSDs in the jewelry production sector. One of the main causes of occupational injury and damage in developed as well as industrialized countries is musculoskeletal disorders (MSD), which are also known as cumulative trauma disorders (CTD) and repetitive strain injuries (RSI). To design an ergonomic workstation for employees, it is essential to consider occupational health issues, with a focus on musculoskeletal disorders and the workplace

environment.

Literature

The fascial system, which can envelop, interpenetrate, and support bone tissue and skeletal muscles, is a continuity of the musculoskeletal system, which is the body's basic structural component and is made up of muscles, bones, joints, and connective tissues. About 150 distinct pathological disorders are caused by changes in the performance of this complex system's constituent parts, which are linked to the system's overall health. Pain and temporary or permanent impairments in dexterity and movement are common symptoms of musculoskeletal illnesses, which limit a person's capacity to work and engage in social activities.

Work-related MSDs are currently one of the main risk factors for the development of disorders that impact many body parts or systems, like inflammatory diseases and regional pain states, as well as diseases like osteoarthritis, osteoporosis, and sarcopenia.

Work-associated Musculoskeletal disorders (MSDs) include injuries or pains in the joints, ligaments, nerves, tendons, muscles, and structures that support the neck, back, and upper and lower limbs. MSDs can be caused by sudden exertion, repetitive motions, strain, stress exposure, vibration (hand-arm or complete body), and uncomfortable postures. These musculoskeletal strains may affect several body areas, including the upper and lower back, neck, shoulders, and limbs. According to previous longitudinal study, CTS symptoms are associated with poor hand tool design, awkward posture, strong gripping, high repetition, mechanical stress, and vibration on the hand and palm areas.

*Corresponding Author: **Thodeti Manasa**

DOI: <https://doi.org/10.21276/AATCCReview.2025.13.03.249>

© 2025 by the authors. The license of AATCC Review. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

Repetition

[20] Defines repetition as a cycle time of fewer than 30 seconds or more than 50% spent on the same fundamental motion. [21],[16] suggest that repetitive tasks can cause musculoskeletal discomfort or problems.

Awkward postures

Awkward postures occur when the body's limbs, joints, or back deviate significantly from its neutral position while doing tasks. Significant departures from neutral posture may negatively impact muscular efficiency.

According to [18], several factors can increase the risk of musculoskeletal or neurological problems. Awkward posture has been linked to increased risk of musculoskeletal illnesses, including work-related ones [14,3,19,5,11].

Vibration

Whole body vibration (WBV) has been identified as an occupational health concern by studies[7,8]. Long-term driving, sitting on a vibrating seat, or traveling in any vibrating mode can cause musculoskeletal discomfort [1,2,9,11,12,13], hand-arm vibration is a significant contributing factor to the development of hand-arm syndrome in various activities, in addition to whole-body vibration.

Long duration of exposure

prolonged exposure to pipetting caused hand complaints that steadily intensified with time[4]. Longer working hours were associated with increased hand problems. According to [6], computer users who used computers for more than 15 hours per week experienced more musculoskeletal complaints than those who used computers less frequently. Muscle tiredness increased with longer work days[17].

The whole-day work exposure affected all three dimensions (general, mental, and physical) [21]. General fatigue was observed at the beginning and end of the work shift among the three types of fatigues. 94 per cent of goldsmiths were exposed to vision problems, 93 per cent to back pain, 92 per cent to respiratory diseases, 86 per cent are vulnerable to constipation and piles problems, and 16 per cent and 12 per cent goldsmiths are exposed to dermatitis and dental carries, respectively [10]. Susmita and Rahman (2024) revealed that, about two third of the respondents reported ache, pain, discomfort in multiple sites of the body. More than ninety percent of the respondents suffered ache, pain, discomfort in the hip or thigh followed by lower back, knee, neck, upper back, shoulder, wrist/hands, ankle/foot, elbow in last 12 months. It states that there was significant association between ages, working experience with musculoskeletal symptoms and suggest that improvement of working conditions and control of risk factors for musculoskeletal symptoms are very essential.

Conclusion

Musculoskeletal discomforts in jewelry workplaces are a major problem for employees, affecting their health, productivity, and well-being. These discomforts are frequently caused by repeated actions, awkward postures, extended standing or sitting, and the use of hand tools. These variables can eventually contribute to chronic illnesses like carpal tunnel syndrome, tendinitis, and back or neck pain.

To mitigate these hazards, ergonomic measures such as flexible workstations, adequate sitting, and encouraging regular stretching and movement breaks must be implemented.

Education on posture, body mechanics, and the significance of tool design in reducing strain can also help prevent injury. Furthermore, creating a work environment that promotes employee health and comfort through regular examinations and adjustments is critical for decreasing musculoskeletal discomfort in jewelry work environments.

References

1. Andersson, R. 1992. The back pain of bus drivers, Prevalence in an urban area of California. *Spine*.17:1481 - 1488.
2. Chen, J.C., Chang, W.R., Chang, W and Christiani, D. 2005. Occupational factors associated with low back pain in urban taxi drivers. *Occupational Medicine*. 55:535 - 540.
3. Choobineh, A., Tosian, R., Alhamdi, Z and Davarzanie, M. 2004. Ergonomic intervention in carpet mending operation. *Applied Ergonomics*. 35: 493-496.
4. David G. and Buckle P, A questionnaire survey of the ergonomic problems associated with pipettes and their usage with specific reference to work - related upper limb disorders, *Applied Ergonomics*, 1997,28, 251 – 262
5. Gerbaudo L. and Violante B., Relationship between musculoskeletal disorders and work - related awkward postures among a group of health care workers in a hospital, *Med Lav*, 2008, 99, 29 - 39.
6. Gerr F, Marcus M. and Ensor C., A prospective study of computer users: I. Study design and incidence of musculoskeletal symptoms and disorders, *American Journal of Industrial Medicine*, 2002, 41, 221-235.
7. Griffin M.J., 1990, *Handbook of Human Vibration*. Academic Press, London, ISBN: 0123030412, pp: 171-220.
8. Griffin MJ., 2006, Health effects of vibration-the known and unknown. *Proceeding of the Conference on Human Vibration*, Morgan Town, DHHS/CDC/NIOSH, WV., pp: 3-4.
9. Hulshof C.T., Verbeek J.H., Braam I.TJ., Bovenzi M. and van Dijk F.J.H., Evaluation of an occupational health intervention programme on whole-body vibration in forklift track drivers: a controlled trial, *Occupational and Environmental Medicine*, 2006, 63, 461 -468.
10. Hossain T, Sikder T Md and Biswas J D (2015) Assessment of Health Hazards of the Goldsmiths in Tanti bazar Area of Dhaka, Bangladesh. *Advances in Research*. 4. 166-178. 10.9734/AIR/2015/15164.
11. Ismail A.R., Nuawi M.Z., How C.W., Kamaruddin N.F., Nor MJ.M. and Makhtar N.KL, Whole Body Vibration Exposure to Train Passenger, *American Journal of Applied Sciences*, 2010, 7, 352 - 359.
12. Ismail A.R., Yeo M.L., Haniff M.H.M., Zulkifli R., Deros B.M. and Makhtar N.K., Assessment of Postural Loading among the Assembly Operators: A Case Study at Malaysian Automotive Industry, *European Journal of Scientific Research*, 2009, 30, 224-235.

13. Krause N., Ragland D.R., Fisher J.M. and Syme S.L., Psychosocial job factors, physical workload, and incidence of work-related spinal injury: a 5-year prospective study of urban transit operators, *Spine*, 1998, 23, 2507 - 2516.
14. Magnusson M.L., Pope M.H., Wilder D.G. and Areskoug B., Are occupational drivers at an increased risk for developing musculoskeletal disorders? *Spine*, 1996, 21, 710 - 111.
15. Marcus M. and Gerr F., Upper extremity musculoskeletal symptoms among female office workers: Associations with video display terminal use and occupational psychosocial stressors, *American Journal of Industrial Medicine*, 1996, 29, 161 - 170.
16. Mattioli S., Graziosi F., Bonfiglioli R., Barbieri G., Bemardelli S., Acquafesca L., Violante S. F., Farioli A. and Hagberg M., A case report of vibration-induced hand comorbidities in a postwoman, *BMC Musculoskeletal Disorders*, 2011, 12, 47
17. Melzer A.C.S. and Iguti A.M., Working conditions and musculoskeletal pain among Brazilian pottery workers, *Cad. Saude Publico*, 2010, 26, 492 – 502
18. Metgud D.C., Khatri S., Mokashi M.G. and Saha P.N., An ergonomic study of women workers in a woolen textile factory for identification of health - related problems, *Indian Journal of Occupational and Environmental Medicine*, 2008, 12, 14 - 19.
19. Novak C.B. and Mackinnon S.E., Repetitive use and static postures: a source of nerve compression and pain, *Journal of Hand Therapy*, 1997, 10, 151-159.
20. Ramadan A.A. and Ferreira M., Risk factors associated with the reporting of musculoskeletal symptoms in workers at a laboratory of clinical pathology, *Annals of occupational Hygiene*, 2006, 50, 297 - 303.
21. Silverstein, B.A. 1985. The prevalence of upper extremity cumulative trauma disorders in industry. Doctoral Dissertation, University of Michigan, Ann Arbor.
22. Salve U. R. (2017). Prevalence of musculoskeletal discomfort among the workers engaged in jewelry manufacturing. *Indian journal of occupational and environmental medicine*, 19(1), 44–55.
<https://doi.org/10.4103/0019-5278.157008>
23. Waters T.R., Dick R.B., Davis-Barkley J. and Krieg EE., A cross-sectional study of risk factors for musculoskeletal symptoms in the workplace using data from the General Social Survey (GSS), *Journal of Occupational and Environmental Medicine*, 2007, 49, 172-84.