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ARTICLE

Prevalence of Work-Related Musculoskeletal Disorders In Small Scale Industrial Workers: A Cross-Sectional Study.

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ABSTRACT:

Background: Work-related Musculoskeletal Disorders (WMSDs) are the most common in industries that affect the working capacity and frequency of leaves. This study was aimed to find out the prevalence of work-related musculoskeletal disorders in small scale industrial workers.

Methods: This cross-sectional study included 42 workers (Male: 21; Female:21), having an age of more than 18 years, from two small scale industries in MIDC area of Ahmednagar. Data was collected using a structured questionnaire composed of demographic questions, Nordic Musculoskeletal Questionnaire for Work-related MSDs assessment in nine body areas. The prevalence of Work-related MSDs for each body region was determined using percentage. **Result:** Respondents' mean age was 30.77 years (mean ± SD = 7). The mean Body Mass Index (BMI) was 21.81 kg/m2 (± 3.74), and the average work experience was (2.25 years). Among 42 respondents, 29 reported lower back pain (69.04%) and 31 reported neck pain (73.80%); out of 42 participants, 22 reported upper back pain (52.38%). **Conclusion:** The study found that the prevalence was higher in neck (73.80%), lower back (69.04%) and upper back (52.38%) were the most affected areas among small scale industrial workers.

Key Words: Work-related musculoskeletal disorders, Body mass index, Nordic musculoskeletal questionnaire, pain . survivors.

Introduction:

Low backache (LBA), neck pain and other Musculoskeletal Disorders (MSDs) are the foremost causes of disability[1]. LBA ranked highest in terms of disability, followed by neck pain and sixth in terms of Disability-adjusted life-years (DALYs)[2]. Various epidemiological studies have shown evidence of a causal relationship between physical exertion at work and Work-related Musculoskeletal Disorders (Work-related MSDs)[3]. The most prevalent risk factors of work-related MSDs are awkward postures, extensive static work, recurring movements, manual material handling, forceful exertions and vibration [4-6]. Also, job disappointment, stress at work, and tight deadlines encompass major psychosocial factors related to Work-related MSDs[7,8]. Work-related MSDs markedly deteriorate the physical and psychological health and productivity of the industrial workforce [5,9,10] and the costliest form of work disability [11-13].

In an Australian safety and compensation council report regarding Work-related MSDs by industries with the most significant number of cases of Work-related MSDs were from manufacturing, construction, retail trade, transport and storage and health & community Services sectors [14].

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The reasons for Work-related MSDs are poor working postures of workers, lack of job alteration, ergonomically poor design of workstations, low-quality design of plant plan, lack of training, and low-quality condition environment etc. A poor ergonomically and non-scientifically designed work environment and workstation may severely affect the labour force's physical stress, labour productivity, and job performance. Proper application of ergonomics in the design of workstation and scientifically designed work environment will reduce Work-related MSDs. The physical measurement of the workstation should match human anthropometric measurements to avoid workers' awkward postures[15].

There is a lack of literature regarding Work-related MSDs, including ergonomic assessment of Readymade garment worker's exposure to risk factors for the occurrence of Work-related MSDs. Only a limited number of studies from India[17-20] reported musculoskeletal disorders and work-related ergonomic risk factors despite different assessment tools.

This study aimed to determine the prevalence of Work-related MSDs in nine body parts from transformer manufacturing company workers in the MIDC area of Ahmednagar city, India, and ergonomic evaluation of workers' exposure to risk factors the occurrence of Work-related MSDs.

Methodology:

A cross-sectional type of survey was conducted based on Nordic musculoskeletal questionnaires from January 2019 to June 2019. The Nordic Musculoskeletal Questionnaire (NMQ)[16] is a questionnaire permitting comparison of low back, neck, shoulder and general complaints about use in epidemiological studies. The printed Marathi version of the questionnaire was distributed amongst the workers directly during the working hours, and it was collected back the same day. The inclusion criteria were full-time workers from a transformer manufacturing company with an age group of 20- 50 years, at least one year of working experience and 8 hours duty with a 1hr break(8:00 am- 5:00 pm) study.

Individuals with cardiovascular diseases, medical history (e.g. heart failure, chest pain during physical exercise, stroke and myocardial infarction), a severe or traumatic injury to the hand, back, shoulder, arm or neck regions for the past year were excluded from the study.

Two transformer manufacturing companies were selected by convenient sampling method from the list of a transformer manufacturing company in Ahmednagar district in Maharashtra. The questionnaire consisted of a front-page explaining the purpose of the study, general guidelines to complete the questionnaire, contact number and the backside page was a consent form. The questionnaire consists of different parts (i) demographic characteristics of participants. Work-related MSD symptoms like to perceive pain and discomfort at nine body areas were inquired with two sub-questions. The nine body parts include three upper limb segments (shoulder, elbows, wrists/hands), 3 lower limb parts (hip/thighs, knees, ankles/feet) and three trunk segments (neck, upper back and lower back).

Result:

A total of 42 participants were assessed using the Nordic questionnaire. Out of the 42 participants, 21 were females, and 21 were males (Table 1). The mean age was 30.77±07.87, and the mean Body Mass Index was 21.81±1.67. Total 45 numbers questionnaires were distributed amongst the workers of a transformer manufacturing company. Out of 45, only 42 workers returned the questionnaire. Hence the response rate was 93.33%.

Table 1: Demographic Data

Demographic characteristics	Mean±SD
Age (years)	30.77±07.87
BMI (kg/m^2)	21.81±1.67

Table 2: Prevalence of pain according to the Nordic Questionnaire

Body region	Pain during the last 12 months	Pain during the last 7 days
Neck	31(73.80%)	25(59.52%)
Shoulder	17(40.47%)	18(42.85%)
Elbow	18(42.85%)	16(38.09%)
Wrist/hand	10(23.80%)	12(28.57%)
Upper back	22(52.38%)	24(57.14%)
Lower back	29(69.04%)	29(69.04%)
Hips/thighs	7(16.66%)	7(16.66%)
Knees	10(23.80%)	9(21.42%)
Ankle/feet	5(11.90%)	7(16.66%)

In 12 months, the most prevalent WMSDs was neck 31(73.80%), followed by lower back 29(69.04%) and upper back 22(52.38%). The elbow was 18(42.85%), and shoulder 17(40.47%) (table and fig. 1). The 7 days prevalence of WMSDs was also high in the lower back 29(69.04%) followed by neck 25(59.52%) and upper back 24(57.14%).

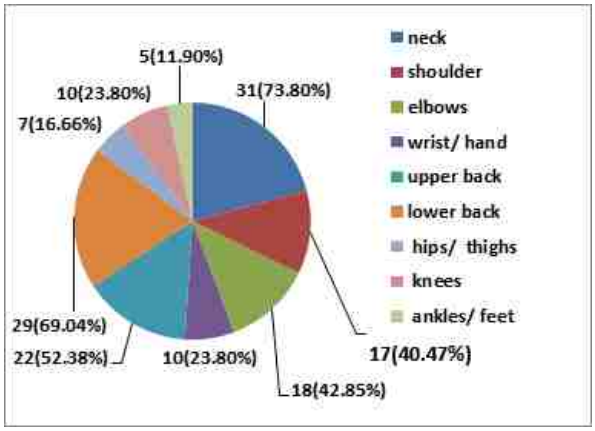

Fig. No. 01 Pain during the last 12 months

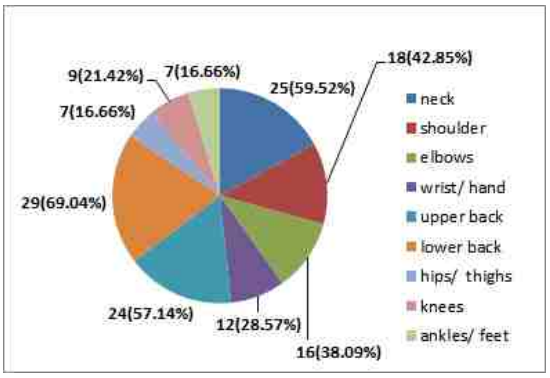

Fig No. 02 Pain during the last 7 days

Among all the nine body regions, neck lower back and upper back was the most frequently reported WMSD as age advances (37.8 ± 3.6), Body Mass Index (26.2 ± 2.4), average years job experience (14.5 ± 7.0) and daily working hour (11.1 ± 0.4).

Figure 1 and 2 shows the percentage distribution of the participants affected with musculoskeletal disorders according to the area of the body affected, which was assessed using the Nordic questionnaire.

Discussion:

Our study found that musculoskeletal pain was prevalent in small scale industrial workers. The most common site of these symptoms was the low back, upper back and neck. The other pain areas include shoulder, elbow, wrist/hands, hips/ thighs, knees, ankle/feet. The reason for this can be that these patients need to be in a sitting position for a continuous 8 hours a day and 5 to 6 days per week. It may cause prolonged static contraction of specific muscles, decreased tissue flexibility, weakened paravertebral muscles and more stress on intervertebral joints.

Recent research has shown that workers who have been employed for an extended period had less risk of landing up with occupational injuries than newly hired workers. Workers with lower job experience did not have sufficient proficiency to fulfil ergonomic risk factors because this situation had effects on their interference with workplaces. In our study, the mean experience of workers was 2.32 years.

Our study results found that the transformer making workers remain in forward bending posture for a prolonged time while working. The range of neck flexion, quality of forward bent posture, and work techniques affects the compressive force on the vertebral discs and the EMG of erector spine muscles[17]. Studies of Jonsson et al.[18], Kilbom et al.[19], Kilbom and Persson[20] dealt with the same cohort study; female electronics workers followed for three successive years. These studies revealed a significant association between posture variables and neck pain. Similarly, our research found that 73.80% of the transformer manufacturing workers were feeling discomfort. It also showed that discomfort among the transformer manufacturing workers was related to MSDs like neck pain at 73.80% and lower back at 69.04%.

Forces acting on the spine in forward bent posture were considered cervical extensor muscle force and lumbar extensor muscle force. Kumar and Scaife[21] evidenced that the cervical extensor muscle force and lumbar extensor muscle force are found from moment equations which primarily depend on the size of the angels of "δ" neck inclination and "α" back inclination from the upright sitting posture. Thus, for even a 30-degree inclination angle from the vertical, the moment and corresponding muscle forces values are at 50% of the values achieved at 90 degrees (horizontal). The amount of neck strength regarding neck angle (Snyder et al.)[22] shows that we have average neck strength at 30-degree neck inclination.

A study by Jorgensen[23] revealed that most men could maintain a 20 degree forward bending posture because the load-moment increases rapidly for each degree of back inclination above 20 degrees. It is also recognized that when the sitting surface is too low or high, a person leans forward and may lower and protracts the shoulders forward, causing fatigue and pain in the levator scapulae muscles (Cailliet)[24]. This faulty posture does not allow them the flexibility that is necessary for the efficacious completion of the work. 52% reported that supervisory pressure is high, and 76% reported that work demand target-oriented productivity. These conditions suggest that they have to work in a stressed state. Evidence showed that work under stress and attempt to cope with targets could lead to musculoskeletal pain.

The reason for work-related MSD's can be due to the improper design of the workstation. Twisting, bending, and over-reaching are the result of an ill-designed workstation. These movements force the spine into a non-neutral position that increases the general discomfort and pain, particularly at the lower back, neck, and shoulders, which indicate that the transformer manufacturing workers may be affected by work-related MSDs. The limitation of the study was the sample size with a limited number of industries, so the results cannot be generalized.

Future scope:

Future studies can be carried out with a large sample size on nonspecific neck pain in industrial workers. Also, the study can be designed to find out different types of industries in MIDC area. A trial with structured physiotherapy intervention on industrial workers can be undertaken to reduce prevalence.

Conclusion:

The study concluded that the prevalence of musculoskeletal disorders was high in the small scale industry. Commonly affected areas were neck, low back, upper back, followed by shoulder, elbow, and wrist/hands in small scale industrial workers.

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Reference :

1. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet. 2013; 380(9859):2163-96.
2. Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Annals of the rheumatic diseases. 2014; 73(6):968-74.
3. Hossain MD, Aftab A, Al Imam MH, Mahmud I, Chowdhury IA, Kabir RI, Sarker M. Prevalence of work related musculoskeletal disorders (WMSDs) and ergonomic risk assessment among readymade garment workers of Bangladesh: A cross sectional study. PloS one. 2018 Jul 6;13(7):e0200122.
4. Bernard BP, Putz-Anderson V, Burt S. A critical review of epidemiologic evidence for work-related musculoskeletal disorders of the neck, upper extremity, and low back. Cincinnati: Centers for Disease Control and Prevention National Institute for Occupational Safety and Health publication. 1997:97-141.
5. Choobineh A, Tabatabaei SH, Mokhtarzadeh A, Salehi M. Musculoskeletal problems among workers of an Iranian rubber factory. Journal of occupational health. 2007; 49(5):418-23.
6. Punnett L, Wegman DH. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. Journal of Electromyography and Kinesiology. 2004; 14(1):13-23.
7. Sim J, Lacey RJ, Lewis M. The impact of workplace risk factors on the occurrence of neck and upper limb pain: a general population study. BMC public health. 2006; 6(1):234.
8. David G, Woods V, Li G, Buckle P. The development of the Quick Exposure Check (QEC) for assessing exposure to risk factors for work-related musculoskeletal disorders. Applied ergonomics. 2008; 39 (1):57-69.
9. MacDonald L, Karasek R, Punnett L, Scharf T. Covariation between workplace physical and psychosocial stressors: evidence and implications for occupational health research and prevention. Ergonomics. 2001; 44(7):696-718.
10. Nelson NA, Hughes RE. Quantifying relationships between selected work-related risk factors and back pain: a systematic review of objective biomechanical measures and cost-related health outcomes. International Journal of Industrial Ergonomics. 2009; 39(1):202-210.
11. WahlstroÈm J. Ergonomics, musculoskeletal disorders and computer work. Occupational Medicine. 2005; 55(3):168-176.
12. Thiehoff R. Economic significance of work disability caused by musculoskeletal disorders. Orthopade. 2002; 31(10):949-56.
13. Picavet H, Schouten J. Musculoskeletal pain in the Netherlands: prevalences, consequences and risk groups, the DMC 3-study. Pain. 2003; 102(1):167-78.
14. Guo H-R, Chang Y-C, Yeh W-Y, Chen C-W, Guo YL. Prevalence of musculoskeletal disorder among workers in Taiwan: a nationwide study. Journal of occupational health. 2004; 46(1):26-36.
15. Australian Safety and Compensation Council. Work-related musculoskeletal disease in Australia. Canberra: Commonwealth of Australia, 2006.

16. Haile, Eshetu Lemma, Bineyam Taye, Fatuma Hussen. Ergonomic workstations and work-related musculoskeletal disorders in the clinical laboratory. Lab Medicine2012; 43(2):11-19.

17. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, et al. Standardized Nordic questionnaires for the analysis of musculoskeletal symptoms. Applied ergonomics. 1987; 18 (3):233-7.

18. Anderson CK, Chaffin DB, Herrin GD. A Study of Lumbosacral Orientation under Varied Static Loads. Spine 1986:11:456-62.

19. Jonsson BG, Persson J, Kilbom A. Disorders of the cervicobrachial region among female workers in the electronics industry: A two-year follow-up. Int J Ind Ergon 1988;3:1-12.

20. Kilbom A, Horst D, Kemfert K, Richter A. Observation methods for the eduction of load and strain on the human body – A review. Abetarskyddsstyrelsen Publikation Service 1986; 171:92.

21. Kilbom A, Persson J. Work technique and its consequences for musculoskeletal disorders. Ergonomics 1987;30:273-9.

22. Kumar S., and Scaife W.G.S. A precision task, posture and strain. Journal of Safety Research 1979;11:28-36.

23. Snyder RG, Chaffin DB. Bioengineering study of basic physical measurements related to susceptibility to cervical hyperextension-hyperflexion: Highway safety research institute, Tech. Rep., 1975: UM-HSRI-BI-75-6.

24. Jorgensen k. Back muscle strength and body weight as limiting factors for work in standing slightly stooped position. Scand j rehabil med 1970;2:149-53.

25. Cailliet R. Shoulder pain 2nd ed. F. A. Davis; Philadelphia: 1981. p. 38-53.