International Journal of Science and Healthcare Research
Vol. 9; Issue: 3; July-September 2024
Website: ijshr.com
Original Research Article *ISSN: 2455-7587*

Prevalence of Musculoskeletal Disorders in Railway Employees: A Survey Study

Charan Kamal Singh[1], Supreet Bindra[2], Pankajpreet Singh[3]

[1]BPT 4th year Student, [2]Assistant Professor (Department of Physiotherapy), [3]Head of Department (Department of Physiotherapy), SGGSW University, Fatehgarh Sahib, Punjab, India.

Corresponding Author: Charan Kamal Singh

DOI: https://doi.org/10.52403/ijshr.20240315

ABSTRACT

Background: Work-related musculoskeletal disorders (WMSD) related with repetitive and demanding working conditions continue to represent one of the biggest problems in industrialized countries. The railway employees have high possibility of showing musculoskeletal pain due to repetitive motions, lifting heavy loads, awkward posture which leads to bending and twisting injuries and static posture for long duration during.

Aim and Objective: To determine the prevalence and risk factors of musculoskeletal disorders in railway employees. Methodology: The study was conducted among 100 railway employees. The data was collected using self-administered Questionnaire, Nordic Musculoskeletal Questionnaire and Perceived Stress Scale. Both male and female employees having at least 1 year of experience were includes.

Result and Conclusion: the 12-month prevalence of musculoskeletal disorders among railway employees was 79%. Low back pain (26.6%) was found to be most prevalent followed by neck pain (22.8%) and knee pain (20.3%). The Gangmans/ trackmans and Sahayaks were identified to have maximum impact which led to WMSDs. The occurrence of MSD was associated with factors such as age, nature of work, working hours, lifting, and lowering heavy loads, working at pace set by machine and prolonged standing. Thus, education about ergonomics and body posture awareness would be instrumented in prevention of MSDs, thus are recommended.

Keywords: Prevalence, Musculoskeletal Disorders, Risk Factors, Railway Employees.

INTRODUCTION

Musculoskeletal disorders (MSDs) associated with work consists of conditions such as pain, inflammation, tingling, and numbness involving tendons, muscles, nerves, cartilage, ligaments and joints [1]. Often associated to or aggravated by the work, these disorders or injuries are termed as work-related musculoskeletal disorders (WMSDs) [1]. These types of occupational accidents, which result mainly in sprains and fractures, can lead to sick leave due to disability, the length varying with age.[2] Body regions most commonly involved are the low back, neck, shoulder, forearm, and hand, although recently the lower extremity has received more attention [2]. These types of occupational accidents, which result mainly in sprains and fractures, can lead to sick leave due to disability, the length varying with [2].

Work-related musculoskeletal disorders (WMSD) related with repetitive and demanding working conditions continue to represent one of the biggest problems in industrialized countries [3]. These include clinical syndromes such as tendon

inflammations and related conditions (tenosynovitis, epicondylitis, bursitis), nerve compression disorders (carpal tunnel syndrome, sciatica), and osteoarthrosis, as well as less well standardized conditions such as myalgia, low back pain and other regional pain syndromes not attributable to known pathology [4]. Repetitive motions for lifting heavy loads, awkward posture and static posture for long duration during are some of the risk factors for MSD, Indian railways there are directly involved in heavy physical activity and strenuous work [5]. The literature reporting MSDs in railway workers is scanty except few studies which have been conducted in Malaysia [6], Rourkela city (Odissa) [7], Bangladesh [8], we did not come across any study reporting prevalence of musculoskeletal disorders in railway employees in the northern region and that is the topic of interest.

METHODOLOGY

STUDY DESIGN

The study was a cross sectional survey on railway workers of Ambala Division of North India. Workers who fulfilled the eligibility criteria were included in the study.

ELIGIBILITY CRITERIA

Railway employees aged between 20-60 years, male or female, working for more than one year were included in the study. Workers with any recent accident or trauma, sports injury, recent surgery, history of neurological disorder, fracture, psychological disorder, known case of local and systemic infection, inflammation, malignancy were excluded.

DATA COLLECTION

The informed consent was obtained from the study participants. A total of 113 participants were interviewed out of which 8 participants were not found to be eligible and 5 refused to participate, yielding a sample size of 100 subjects. Interview schedule method was used to collect data using self-administered questionnaire, Nordic Musculoskeletal questionnaire, and Perceived Stress Scale at a language and pace understandable to the workers. Interview during leisure hours was taken in to consideration.

DATA ANALYSIS

The collected data was entered into the excel and analysed using statical package for social science (SPSS) window version 26 and summarized using descriptive statistics of the bar chart, pie chart, frequency and percentages using tables. Inferential statistics was used to determine the association between variables at an alpha level of $P<0.05$.

RESULT

Table 1 depicts 12-month prevalence of musculoskeletal disorders among police Employees. The 12 month prevalence of MSD's was found to be 79%.

Table 1: 12 Month Prevalence of Musculoskeletal disorders among Railway Employees.

12 Month Prevalence of MSDs	Absolute No	%
Yes	79	79.0
No	21	21.0

Table 2: reveals the region wise distribution of the pain in the railway employees. Low back pain owned the highest number (26.6%) followed by neck pain 22.8% and knee pain (20.3%).

Table 2: Region Wise Distribution of the WMSDs in Railway Employees.

Region Wise Distribution of Pain	Absolute No	%
Neck	18	22.8
Shoulder	6	7.6
Elbow	6	7.6
Wrist/Hand	6	7.6
Upper Back	3	3.8
Lower Back	21	26.6

Hips/Thighs	1	1.3
Knees	16	20.3
Ankles/Feet	2	2.5

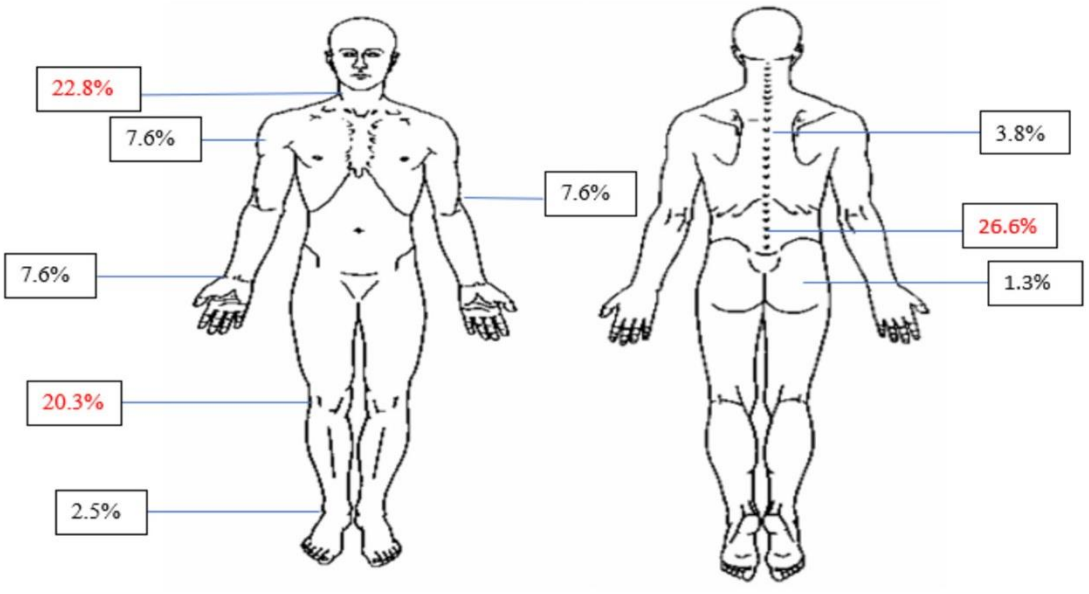

Fig 1: Region wise pain distribution among subjects

Table 3: Presents the association of demographic characteristics with the 12 months prevalence of work-related musculoskeletal disorders. Subjects from the age group of 50 to 60 years (84.21%) had higher prevalence of MSD. The 12-month prevalence of the WMSD's revealed increasing trend with work experience. When analyzed according to the nature of work, prevalence of MSD was higher in gangmen/trackmen and sahayaks (88.8%) followed by engineers (63.6%) and ticket checkers. All the workers who worked for 12 to16 hours, reported WMSDs. Age, nature of work and working hours were found to be associated with prevalence of WMSDs.

Table 3: Association of the Demographic Characteristics with 12 month Prevalence of MSD's

Characteristics	**12 months prevalence**				
Age (years)	**Yes n (%)**	**No n (%)**	**Total N (%)**	**X2**	**P value**
20-30	2 (33.33)	4 (66.66)	6 (100)		
30-40	28 (80)	7 (20)	35 (100)	8.234	0.041*
40-50	17 (80.95)	4 (19.04)	21 (100)		
50-60	32 (84.21)	6 (15.78)	38 (100)		
Gender					
Male	72 (77.41)	21 (22.58)	93 (100)		
Female	7 (0.07)	0 (	7 (100)	2.001	0.157 NS
Level of Education					
None	12 (92.30)	1 (7.69)	13 (100)		
Primary	6 (85.71)	1 (14.28)	7 (100)	4.969	0.174 NS
Elementary	22 (88)	3 (12)	25 (100)		
High school or more.	39 (70.90)	16 (29.09)	55 (100)		
Marital Status					
Single	4 (50)	4 (50)	8 (100)		
Married	74 (81.31)	17 (18.68)	91 (100)	4.616	0.099 NS
Divorced	1 (100)	0	1 (100)		
Size of Family					

1-3	19 (39.13)	4 (17.39	23 (100)		
3-6	57 (79.16)	15 (20.83)	72 (100)	1.270	0.530 NS
More than6	3 (60)	2 (40)	5 (100)		
Number of Children					
None	10 (76.92)	3 (23.07)	13 (100)		
1-2	41 (82)	9 (18)	50 (100)	0.553	0.907 NS
More than 2	28 (75.67)	9 (24.32)	37 (100)		
Year of Experience					
0-10	27 (75)	9 (25)	36 (100)		
11-20	19 (82.60)	4 (17.39)	23 (100)	0.592	0.898 NS
More than 20	33 (80.48)	8 (19.51)	41 (100)		
Level of Enrolment					
Class A	1 (100)	0	1 (100)		
Class B	2 (100)	0	2 (100)		
Class C	35 (74.46)	12 (25.53)	47 (100)	1.651	0.648 NS
Class D	41 (82)	9 (18)	50 (100)		
Nature of the Work					
Gang man /trackman	32(88.88)	11 (11.11)	36(100)		
Sahayaks	30 (69.76)	13 (30.23)	43 (100)	12.613	0.027*
Engineers (Junior Engineer and Senior Engineer)	7 (63.63)	4(36.36)	11 (100)		
Ticket checking staff/booking clerk	9 (90)	1 (10)	10 (100)		
Working Hours					
1-8 hours	43 (70.49)	18 (29.50)	61 (100)		
8-12 hours	25 (89.25)	3 (10.71)	28 (100)	7.371	0.025*
12-16 hours	11 (100)	0	11 (100)		
Number of Days working in per week					
4-5	1 (100)	0	1 (100)		
6-7	78 (78.78)	21 (21.21)	99 (100)	0.269	0.604 NS
Body Mass Index					
Underweight	3 (100)	0	3 (100)		
Normal	45 (81.81)	10 (18.18)	55 (100)	3.425	0.327NS
Pre-obese	23 (79.31)	6 (23.07)	29 (100)		
Obese	8 (61.53)	5 (38.46)	13 (100)		

***p<0.05 **p<0.01 ***p<0.001 Non-Significant NS**

Table 4: presents association of the lifestyle factors with 12 month prevalence of WMSDs. Although the prevalence of WMSD's was high among workers who had a habit of smoking/alcohol consumption/sleep disorder, these factors were not found to be associated with WMSD's on further analysis.

Table 4: Association of Lifestyle factors with 12-month Prevalence of MSD's

Characteristics	**12 months prevalence**				
Do you smoke	**Yes n (%)**	**No n (%)**	**Total N (%)**	**X2**	**P value**
Yes	28 (87.5)	4 (12.5)	32 (100)	2.049	0.152 NS
Consume alcohol					
Yes	31 (81.57)	7 (18.42)	38 (100)	0.246	0.620 NS
Sleep disorder					
Yes	31 (81.57)	7 (18.42)	38 (100)	0.246	0.620 NS

***p<0.05 **p<0.01 ***p<0.001 Non-Significant NS**

Table 5: presents the association of physical and environmental risk factors with 12 months prevalence of WMSDs. The 12-month prevalence of WMSD's was higher in employees who lifted and lowered heavy loads and those who worked at the pace set by machine. 84% of the individuals who reported prolonged standing had WMSDs.

Table 5: Association of Physical and Environmental risk factors with 12-month Prevalence of MSD's

Characteristics	12 months prevalence				
Lifting and lowering heavy loads	**Yes n (%)**	**No n (%)**	**Total N (%)**	**X2**	**P value**
Yes	43 (87.75)	6 (12.24)	49 (100)	4.439	0.035*
Work in vibrating vehicles					
Yes	40 (85.10)	7 (14.89)	47 (100)	1.993	0.158 NS
Work at pace set by machine					
Yes	43 (87.75)	6 (12.24)	49 (100)	4.439	0.035*
Working hot and humid Environment					
Yes	77 (79.38)	20 (20.61)	97 (100)	0.284	0.594 NS
Cold Environment					
Yes	78 (78.78)	21 (21.21)	99 (100)	0.269	0.604 NS
Prolonged seated posture					
Yes	22 (70.96)	9 (29.03)	31 (100)	1.747	0.186 NS
Prolonged standing posture					
Yes	63 (84)	12 (16)	75 (100)	4.521	0.033*

***p<0.05 **p<0.01 ***p<0.001 Non-Significant NS**

Table 6: presents the data on the psycho-behavior risk factors lead to WMSDs. Very few subjects had high level of stress, close to 80% of the subjects under study reported low to moderate level of stress. However perceived level of stress was not found to be associated with the WMSDs.

Table 6: Association of Psycho-Behavior risk factors with 12 month Prevalence of MSD's

Characteristics	12 months prevalence				
Perceived stress scale	**Yes n (%)**	**No n (%)**	**Total N (%)**	**X2**	**P value**
Low Stress	36 (76.59)	11 (23.40)	47 (100)		
Moderate Stress	40 (80)	10 (20)	50 (100)	0.991	0.609 NS
High Stress	3 (100)	0	3 (100)		

***p<0.05 **p<0.01 ***p<0.001 Non-Significant NS**

DISCUSSION

Indian railway has its hierarchy of workers who work on various ranks and division. This study was done to identify out the prevalence of the WMSDs among railway employees of the Ambala Division. The study revealed the prevalence of WMSDs among railway employees to be 79%. Low back pain owned the highest prevalence (26.6%) followed by neck pain (22.8%) and knee pain (20.3%). Back pain in relation to MSDs can stem from various causes, including poor posture, repetitive motions, lifting or carrying heavy loads, prolonged sitting or standing in awkward positions, and inadequate ergonomics in the workplace [9].

The prevalence of musculoskeletal disorders was found to increase with advancing age, and workers with more experience were prone to WMSDs. Male out numbed females in terms of higher prevalence of MSD. This could be attributed to greater number of males in our study. Gangmans/Trackmans followed by the Sahayaks were found to have highest prevalence of MSD. We did not come across any study reporting musculoskeletal Disorder in Gangmans/Trackman's but studies on sahayaks or coolies have reported prevalence of MSD ranges between 39.8% to 65% [7,10]. Relationship between WMSDs and level of education was found to be non-significant, on the contrary, Putrik, 2013 explained the significant correlation between education level and MSD because high education level can improve the method to prevent the MSDs [11]. Further on finding the working hours of the railway employees were found significant as the increasing fashion of working hours with MSDs witnessed hike with time period.

Consuming Alcohol and smoking leads to weaking of bones, causing an increased risk of fracture and broken bone [12]. It is reported that the working in Night shift leads to sleep loss and increased risk of obesity and diabetes [13]. Above 80% of the workers with WMSDs had a habit of smoking, alcohol, and sleep disorders, however none of these factors were found to be associated with prevalence of MSD in railway employees.

Physical and environmental factors such as lifting and lowering heavy loads, working at the pace set by machine and prolonged standing were found to be associated with WMSDs. Carrying heavy load on the head can cause degenerative changes in the cervical spine [10]. Long term heavy load carrying on the head may exacerbate the process of disc degeneration in the cervical spine [8] which could have led to neck pain.

Heavy work load, demanding schedules and tight deadlines can increase the stress level among railway employees and with this limited anatomy and control over work related decisions can contribute to feeling of stress and frustration for the employee [14,15,16]. 50% of the subjects under study reported moderate level of stress on PSS, out of which 86% of the subjects reported an MSD in the past 12 months. There is evidence to suggest that high level of Perceived Stress can contribute to various health issues, including MSD [17]. We did not find any association between the factors of the Perceived Stress Scale (PSS) and WMSDs in railway employees which could attributed to the small sample size of the study and warrants further investigation.

CONCLUSION

The study found the higher prevalence of MSD among Railway workers. The prevalence of MSDs was more in men. Back, neck and knees were most affected. Gangmans/trackmans and Sahayaks were identified to have maximum impact which led to WMSDs but the findings of the study are difficult to generalize because of small sample size and paucity of literature. Thus, further studies with large sample size are needed. Education about ergonomics and body posture awareness would be instrumental in prevention of MSDs, thus are recommended.

Declaration by Authors

Ethical Approval: Approved
Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Lei L, Dempsey PG, Xu J-G, et al., Risk factors for the prevalence of musculoskeletal disorders among Chinese foundry workers. Int J Ind Ergon. 2005; 35:197–204.
2. Manning DP. Deaths and injuries caused by slipping, tripping, and falling. Ergonomics Skiba R. Unfallschwerpunkt Nr.1: Stolpern und ausrutschen. Hum Prod 1983; 10:16–18.
3. McCauley-Bell, P., Badiru, A. Fuzzy Modelling and Analytic Hierarchy Processing to Quantify Risk Levels Associated with Occupational Injuries Part I: The Development of Fuzzy Linguistic Risk Levels. IEEE Transactions on Fuzzy Systems, 1996; Vol. 4, No. 2, pp. 124-131.
4. Laura Punnett, David H. Wegman., Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. Journal of Electromyography and Kinesiology Volume 14, Issue 1, February 2004, Pages 13-23.
5. Rossi D, Bertoloni E, Fenaroli M, et al. A multicriteria ergonomic and performance methodology for evaluating alternatives in “manuable” material handling. Int J Ind Ergon. 2013; 43:314–327.
6. Aqsa Irshad, Syed Zahra Gillani, Naveed Anwar, Muhammad Salman Butt, Kehkshan Khalid and Mahar Safdar Ali Qasim. Prevalence of Musculoskeletal Disorders among Manual Workers in Railway Workshops Lahore. Ann Med Health Sci Res. 2021; 11:1512-1516.
7. Khan MR, Singh NK. Prevalence of musculoskeletal disorders among Indian railway sahayaks. Int J Occup Environ Health. 2018; 24:27-37.
8. Mahbub MH, Laskar MS, Seikh FA, et al. Prevalence of cervical spondylosis and

musculoskeletal symptoms among sahayaks in a city of Bangladesh. J Occup Health. 2006; 48:69–73.
9. Burdorf, A. The role of work-related factors in the development of neck and upper limb complaints. Scandinavian Journal of Work, Environment & Health. 2006; 32(5), 283-297.
10. HJ Jager, L. Gordon-Harris, UM Mehring, GE Goer and KD Mathias: Degeneratives changes in the cervical spine and load carrying on the head. Skeletal Radiol 26, 475-481 (1997).
11. Putrik P, Ramiro S, Chorus AM, Boonen A. People with lower education, inactive working status and female gender are more likely to have musculoskeletal disease. *Ann Rheum Dis* 2013; 72 suppl 3: A767–A768.
12. Office of the Surgeon General. Bone health and osteoporosis: a report of the Surgeon General. Rockville, MD: US Department of Health and Human Services, Offi ce of the Surgeon General; 2004.
13. Knutson KL, Van Cauter E. Associations between sleep loss and increased - risk of obesity and diabetes. Ann NY Acad Sci. 2008,1 1 29.287-304.
14. Clays E, Bacquer DD, Leynen F, Kornitzer M, Kittel F, Backer GD. The impact of psychosocial factors on low back pain: longitudinal results from the Belstress study. Spine 2006; 32:262–268.
15. Waddell G, Burton AK. Occupational health guidelines for the management of low back pain at work: evidence review. Occup Med (Lond) 2001; 51:124–135
16. Van Nieuwenhuyse A, Fatkhutdinova L, Verbeke G et al. Risk factors for first-ever low back pain among workers in their first employment. Occup Med (Lond) 2004; 54:513–519.
17. Deeney, C., and O'Sullivan, L. Work related psychosocial risks and musculoskeletal disorders: Potential risk factors, causation, and evaluation methods. Work. 2009; 34(2), 239–248.

How to cite this article: Charan Kamal Singh, Supreet Bindra, Pankajpreet Singh. Prevalence of musculoskeletal disorders in railway employees: a survey study. *International Journal of Science & Healthcare Research.* 2024; 9(3): 117-123. DOI: *https://doi.org/10.52403/ijshr.20240315*

******