# Prevalence of Musculoskeletal Disorders among Manual Workers in Railway Workshops Lahore

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#### Abstract

Our study aims to find the prevalence of the musculoskeletal disorder among manual workers of the railway. Manual workers in our study were welders, helpers, painters, blacksmiths, coachbuilders and manual machine handlers working for a year in railway. It is an observational study with a sample sizeof 300 male manual workers of Pakistan railway, Lahore. Prevalence of musculoskeletal disorderin the last 12 months was determined using the Nordic musculoskeletal questionnaire. 96% of manual workers reported musculoskeletal disorders in at least 1 body region in the previous 12 months. The most prevalent areas were lower back (71.3%), shoulders (50.7%), knees (48%) and upper back (41.3%). Other areas had following prevalence rate elbows (16%), hips (11.7%), ankles (11%), neck (7.7%) and wrist and hands (3.3%). This study concludes high prevalence of musculoskeletal disorders among manual workers of the Lahore railway that can cause further morbidities and functional limitations.

**Keywords:** Prevalence; Musculoskeletal disorders; Orthopedic disorders; Manual worker; Railway workers

# Introduction

Musculoskeletal disorders have a greater prevalence and severe consequences for the workers. <sup>[1]</sup> According to the previous researches in Asia prevalence of musculoskeletal symptoms was 65% in Railway Sahayaks (coolie) of India. <sup>[2]</sup> Similarly 95% of manual workers in Calcutta, India reported musculoskeletal disorders. <sup>[3]</sup>

These Musculoskeletal disorders cost approximately 171.7 million USD dollars in developing countries.<sup>[2]</sup> Al-Dubai et al. conducted a cross-sectional study on 513 railway workers in 8 different states of Malaysia. To determine the relationship of high-risk working behaviors to the highly prevalent knee pain, they collected data on socioeconomic status, occupational safety, risky job tasks, and knee pain complaints. Results revealed a 31.6% prevalence of knee pain in the last 1 year. Also, a significant relationship was found between knee problems and work-related factors. [3] Hossein et al. conducted a cross-sectional study in 2011 to evaluate the prevalence of work-related musculoskeletal disorders and related factors among 160 welders working at a petrochemical complex in south Iran. The Nordic musculoskeletal questionnaire was used. WMSDs occurred at a high rate (88.3%) among these workers, suggesting ergonomic intervention's need. Most affected regions were shoulder, wrist and hand.<sup>[4]</sup>

In the United States, Canada, Finland, Sweden, and England, musculoskeletal disorders become a reason for most work absentees. <sup>[5]</sup> Despite the mechanization in the industries all over the world, workers in these industries still have to carry out manual material handling tasks for earning. Repetitive arm movements are associated with neck pain and upper extremity symptoms. <sup>[6]</sup> The worldwide lifetime prevalence of work-related low back pain ranges between 30%-84%. <sup>[7]</sup> In Pakistan,

the problems associated with the health of laborers given very little importance. Very few sectors work on occupational health problems all over the country [Tables 1-3].

In the current research work, we planned to find the prevalence of musculoskeletal disorders in manual workers of the Pakistan railway. Through the result of this study, we believe to contribute some knowledge of ergonomic needs to improve the health and working ability of manual workers in Pakistan Railway.<sup>[8-10]</sup> The objective of this study was to measure the prevalence of musculoskeletal disorders among railway workshops manual workers with a work experience of more than 1 year in relation to their job demand.

# **Subjects and Methods**

It is an observational study with a cross-sectional design. The data was collected from every participant through direct interviews conducted at the railway premises of Lahore. After ethical approval from the internal review board, the research work was conducted. <sup>[11-15]</sup> The data was collected after the approval of internal review board and the workshop managers from carriage and wagon shop and locomotive workshop. Both of these workshops were located in Mughalpura, Lahore (Lahore is one of cities in Pakistan) and had the required amount of 300 manual workers who were the target population. Purposive sampling technique was used based onpredefined inclusion/ exclusion criteria [Figures 1-3].

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le 1: Descriptive stat	istics of demographic varia	bles.			
Demographic De	scriptive Statistics	Frequency	Percentage	Mean	Std. deviation
	20-30	11	3.7	48.61	9.004
Ago (voare)	31-40	62	20.7		
Age (years)	41-50	75	25		
	Greater Than 50	152	50.7		
	Total	300	100		
	15-25	92	30.7		
	26-35	141	47		
Bivii (kg/m²)	36-45	64	21.3		
	Greater than 45	3	1		
	Total	300	100		
	illiterate	67	22.3		
	Primary	173	57.7		
Education	Secondary	35	11.7		
	Bachelors	25	8.3		
	Total	300	100		
Smoking	No	173	57.7		
	Yes	127	42.3		
	Total	300	100		
	2-10 Years	27	9	25.2	10.18
	11-20 Years	86	28.7		
Experience	21-30 vears	85	28.3		
Experience	Greater than 30 years	102	34		
	Total	300	100		
	Sitting	33	11		
	Standing	230	76.7		
Posture	Both	37	12.3		
	Total	300	100		
	No	89	29.7		
Training	Yes	211	70.3		
	Total	300	100		
	0	89	29.7		
	1	70	23.3		
Training Duration (Years)	2	3	1		
	- 3	135	45		
	4	3	1		
	Total	300	100		
	Mild	108	36		
<b>F</b> ace with a set	Moderate	87	29		
Exercion	High	105	25		
	Total	200	100		

|--|

		N	Percentage
	No	3	1
Disorder	Yes	297	99
	Total	300	100
	No	14	4.7
MSK	Yes	286	95.3
	Total	300	100
	No	202	67.3
Pulmonary	Yes	98	32.7
	Total	300	100
	No	262	87.3
ENT	Yes	38	12.7
	Total	300	100
	No	202	67.3
Psychological	Yes	98	32.7
	Total	300	100

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<b>300</b> 11 234 7 66 22	0 0 8 2
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114 3	0
44.4	8
186 6	2
	186 6

# Table 3: Nordic musculoskeletal questionnaire statistics.

		Trouble in last 12 months	Trouble in last 7 days		
Body Regions		Frequency (Percent)	Frequency (Percent)		
	No	277 (92.3%)	295 (98.3%)		
Neck	Yes	23 (7.7%)	5 (1.7%)		
	Total	300 (100.0%)	300 (100.0%)		
	No	146 (48.7%)	296 (98.7%)		
	Right shoulder	30 (10.0%)	2 (0.7%)		
Shoulders	Left shoulder	5 (1.7%)	2 (0.7%)		
	Both shoulder	119 (39.7%)			
	Total	300 (100.0%)	300 (100.0%)		
	No	248 (82.7%)	293 (97.7)		
	Right elbow	23 (7.7%)	5 (1.7)		
Elbows	Left elbow	3 (1.0%)	1 (0.3%)		
	Both elbow	26 (8.7%)	1 (0.3%)		
	Total	300 (100.0%)	300 (100.0%)		
	No	290 (96.7%)	298 (99.3%)		
M/rioto/boxdo	Right wrist/hand	4 (1.3%)	2 (0.7%)		
WISts/Hallus	Both wrists/hands	6 (2.0%)			
	Total	300 (100.0%)	300 (100.0%)		
	No	176 (58.7%)	295 (98.3%)		
Upper back	Yes	124 (41.3%)	5 (1.7%)		
	Total	300 (100.0%)	300 (100.0%)		
	No	86 (28.7%)	297 (99.0%)		
Lower back	Yes	214 (71.3%)	3 (1.0%)		
	Total	300 (100.0%)	300 (100.0%)		
	No	265 (88.3%)	300 (100.0%)		
Hips/thighs/buttocks	Yes	35 (11.7%)			
	Total	300 (100.0%)	300 (100.0%)		
	No	154 (51.3%)	296 (98.7%)		
Knees	Yes	146 (48.7%)	4 (1.3%)		
	Total	300 (100.0%)	300 (100.0%)		
	No	267 (89.0%)	297 (99.0%)		
Ankles/feet	Yes	33 (11.0%)	3 (1.0%)		
	Total	300 (100.0%)	300 (100.0%)		



Figure 1: Fitter.



Figure 2: Carriage and wagon workshop.

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#### **Inclusion criteria**

1. Male workers.

2. Age 18 yrs-60 yrs.

3. Have been doing manual work for minimum 40 hr/week.

4. Minimum Work Experience of 1 year before participation in the study.

# **Exclusion criteria**

- 1. Any recent accident or trauma (last 12 month).
- 2. Any recent surgeries.
- 3. Computer operators and clerical staffs/desk-based jobs.

# Methodology

After getting the authority's permission the verbal consent



Figure 3: Welder.

was taken from every participant individually. A research questionnaire was administered in one-to-one interviews where the first part of the questionnaire contained demographic information and the second part was a modified Nordic Musculoskeletal Questionnaire. The later part of the questionnaire asks about the presence of musculoskeletal

Table 4: Activity prevention in last 12 months.					
Body Regions	Frequency (Percentage)				
	No	278 (92.7%)			
Neck	Yes	22 (7.3%)			
	Total	300 (100.0%)			
	No	156 (52.0%)			
Shoulders (both/either)	Yes	144(48.0%)			
	Total	300 (100.0%)			
	No	263 (87.7%)			
Elbows (both/either)	Yes	37 (12.3%)			
	Total	300 (100.0%)			
	No	293 (97.7%)			
Wrists/hands (both/either)	Yes	7 (2.3%)			
	Total	300 (100.0%)			
	No	208 (69.3%)			
Upper back	Yes	92 (30.7%)			
	Total	300 (100.0%)			
	No	113 (37.7%)			
Lower back	Yes	187 (62.3%)			
	Total	300 (100.0%)			
	No	273 (91.0%)			
Hips/thighs/buttocks	Yes	27 (9.0%)			
	Total	300 (100.0%)			
	No	179 (59.7%)			
Knees	Yes	121 (40.3%)			
	Total	300 (100.0%)			
	No	271 (90.3%)			
Ankles/feet	Yes	29 (9.7%)			
	Total	300 (100.0%)			

Table 5: Relationship between demographic variables and prevalence of MSDs: Last 12 months.									
Demographic variables	Neck	Shoulder	Elbow	Wrist and hand	Upper back	Lower back	Hips and buttocks	Knee	Ankle and feet
Age groups	0.271	0.835	0.247	0.427	0.213	0.942	0.218	0.024*	0.271
BMI groups	0.425	0.339	0.206	0.002*	0.123	0.000*	0.022*	0.000*	0.264
Smoking	0.101	0.764	0.806	0.38	0.192	0.007*	0.305	0.17	0.063
Education	0.505	0.074	0.803	0.843	0.017*	0.001*	0.412	0.096	0.157
Experience groups	0.013*	0.047*	0.31	0.195	0.000*	0.000*	0.025*	0.001*	0.07
Posture	0.679	0.000*	0.001*	0.385	0.001*	0.000*	0.118	0.000*	0.073
Training	0.933	0.047*	0.247	0.961	0.018*	0.001*	0.183	0.014*	0.035*
Training Duration	0.194	0.06	0.000*	0.001*	0.081	0.000*	0.125	0.074	0.132
Exertion	0.13	0.021*	0.029*	0.407	0.807	0.001*	0.958	0.006*	0.789

Table 6: Relationship between demographic variables and prevalence of MSDs : Last 7 days. Demographic Ankle and Neck Shoulder Elbow Wrist and hand Upper back Lower back Knee variables feet 0.542 0.24 0.901 0.581 0.305 0.807 0.572 Age groups 0.28 BMI groups 0.475 0.43 0.736 0.873 0.475 0.332 0.654 0.332 Smoking 0.915 0.226 0.55 0.826 0.308 0.751 0.755 0.751 Education 0.001\* 0.001\* 0.457 0.774 0.846 0.401 0.24 0.527 0.438 Experience groups 0.288 0.121 0.201 0.165 0.237 0.475 0.956 Posture 0.002\* 0.431 0.002\* 0.736 0.081 0.202 0.023\* 0.003\* Training 0.143 0.425 0.901 0.528 0.633 0.258 0.837 0.258 0.000\* **Training Duration** 0.338 0.015\* 0.000\* 0.969 0.843 0.76 0.448 Exertion 0.313 0.334 0.697 0.167 0.904 0.433 0.836 0.986

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disorders in 9 body areas during last 12 months.

#### Result

The descriptive statistics of demographic variables, presence of systemic disorder among participants, Nordic musculoskeletal questionnaires statistics, activity prevention on last 12 months, relationship between demographic variables and prevalence of MSDs: Last 12, relationship between demographic variables and prevalence of MSDs: Last 7 days are mentioned in the tabular form [Tables 4-6].

#### Discussion

The prevalence of musculoskeletal disorders in this study is 96%, with most commonly found anatomical body areas to be affected were lower back (71.3%), shoulders (50.7%), knee (48%) and upper back (41.3%).

A similar finding was reported in a research conducted by Thakur where the prevalence of MSDs in last 12 months was found to be 91% among 200 Indian railway coolies. <sup>[5]</sup> Also in their study highest reported anatomical region for disorder in last 12 month was lower back that is also similar to our results. <sup>[5]</sup> Similar to the high prevalence of pain in the lower back region (71.3%) in our study, the research conducted by Ganasegeran on the prevalence of low back pain among railway workers showed a 69% prevalence. <sup>[6]</sup>

As determined in a study conducted on welders there was a high prevalence of musculoskeletal disorders assessed by NMQ (88.3%) in which shoulder, neck, lower back, and knees presented as the most affected areas. These results are quite in coordination with our study results, where, shoulder, knee, lower back, and upper back were found to be prevalent. <sup>[4]</sup> According to the results obtained from the Nordic MSK Questionnaire, only 12 out of 300 participants reported no musculoskeletal disorder. Thus, 288 (96%) subjects reported trouble in at least one body region in last 12 months. The highest prevalence of MSD was found in lower back (71.3%), followed by shoulders (50.7%), knees (48%), upper back (41.3%), elbows (16%), hips (11.7%), ankles/feet (11%), neck (7.7%) and wrists/hands (3.3%) respectively in preceding 12 months.

# Conclusion

The high prevalence of musculoskeletal disorders measured in our study had a significant relation to some of the demographic characteristics such as BMI, working posture, work experience, level of exertion and some systemic disorder. Where, the most affected areas were lower back which had a significant relationship with BMI, smoking, education, experience, posture, training, training duration, and exertion. Such prevalence of musculoskeletal disorders needs to be addressed in order to improve well-being and physical health status of manual workers under the guidelines of occupational health and safety.

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