

## Prevalence of Musculoskeletal Disorders and Their Associated Risk Factors Among Bus Rapid Transit Staff in Peshawar

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### Abstract

*Musculoskeletal disorders (MSDs) are a group of inflammatory and degenerative disorders affecting muscles, tendons, ligaments, joints and peripheral nerves. Around 1.71 billion people worldwide suffer from musculoskeletal disorders, according to the World Health Organization (WHO). A cross-sectional study was done on 334 participants at BRT staff Peshawar. The study duration was 6 months, the sample size was calculated through the Raosoft calculator 25 versions, and a non – probability convenience sampling method was used to collect data. Out of 334 participants n= 296(88.6%) were male, and n= 38(11.4%) were female; regarding the occupation, among 334 participants, n=75 were drivers, 126 were security guards, sweepers were 80, and ticketing managers were 53. Out of 334 participants, n=203 have no pain, and n=131 have musculoskeletal pain. The most common musculoskeletal problem is knee pain, followed by low back pain. The finding of this study showed that (n=131) participants out of 334 participants have musculoskeletal disorders; the prevalence of musculoskeletal disorders is significant in security guards, followed by sweepers. The most commonly affected area in security guards is the knees (n=18), followed by low back (n=16), whereas, in sweepers, the most affected area is the knee (n=12), followed by low back (n=10). In contrast, in drivers most frequently affected area is the neck (n=10), followed by low back (n=6).*

**Keywords:** BRT, Body Mass Index, Drivers, Musculoskeletal Disorders, Security Guards, Sweepers

### Introduction

Musculoskeletal disorders (MSDs) are a group of inflammatory and degenerative disorders affecting muscles, tendons, ligaments, joints and peripheral nerves. These are clinical syndromes that consist of

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inflammation of the tendon and related conditions such as (tenosynovitis, which is the inflammation of the fluid-filled sheath which surrounds the tendon, epicondylitis is the inflammation of the epicondyle, bursitis is the inflammation of the bursa), nerve compression disorders such as (carpal tunnel syndrome causes when the median nerve is compressed at the wrist, sciatica caused when the sciatic nerve is compressed ), osteoarthritis is the most common form of arthritis(Aini & Huda, 2015).

According to the WHO, globally, around 1.71 billion people suffer from MSDs. Back pain has the highest prevalence burden among musculoskeletal disorders, affecting 568 million people worldwide and being the main contributor to disability in 160 countries. About one-third of all sick leave cases for healthcare workers are related to MSDs originating in the neck, shoulder, and back, and the risk factor is uplifting heavy physical load(Meijssen & Knibbe, 2007).

Musculoskeletal disorders are of three types: mild, moderate, and severe; many musculoskeletal disorders occur repetitively(Dembe et al., 2005). MSD is divided into three stages, the early stage, in which pain and tiredness are present while performing tasks but cannot affect individual performance; the intermittent stage, in which symptoms are present during work and night and cause restriction in the work performance of the individual, the final stage in which there is difficulty to perform the task because of pain(Ortiz-Hernández et al., 2003).

The symptoms of musculoskeletal disorders are pain, redness, swelling, functional impairment, tingling, paresthesia, cramps, weakness and stiffness (Zakaria et al., 2002). Many studies show that musculoskeletal disorders account for 50% of work-related illnesses or work-related illnesses. Spinal diseases such as back and neck pain occur among professional drivers (Laal et al., 2018).

The prevalence of musculoskeletal problems among street sweepers was 65.00%(Pintakham & Siriwong, 2016). Different studies have been done on cashiers in other countries or cities. The majority of the studies show that around 70% of cashiers have shoulder and neck pain, and 47% have wrist or hand problems, back pain is the most common problem in cashiers(Algarni et al., 2020). Aweto et al. in (2015) explained a high prevalence of work-related musculoskeletal disorders had been recorded among workers exposed to repetitive and static work and longtime standing, and it was also observed that MSD, stress, fatigue and some other type of physiological disorders could also cause discomfort despite the absence of an injury(Bhandare et al., 2020).

According to our knowledge, bus rapid transit (BRT) is a new project and as per previous studies, the public transport staff is mainly

prone to musculoskeletal disorders. Therefore, it is crucial to understand how common musculoskeletal disorders are among BRT staff in Peshawar.

## **Material and Methods**

### *Approval*

The study was approved by the AHS Research Proposal Review Board of *Iqra* National University Peshawar and the Chief executive officer (CEO) of bus rapid transit Peshawar for data collection.

### *Study Design*

A cross-sectional study was done on bus rapid transit (BRT) staff in Peshawar.

### *Study Setting*

The study was conducted on bus rapid transit (BRT) staff in Peshawar.

### *Study Duration*

The duration of the study was six months.

### *Sample Size*

The sample size was calculated through the Raosoft sample size calculator.

### *Sampling Technique*

Non-probability convenience sampling method was used to recruit the participants.

### *Inclusion Criteria*

- Both males and females.
- Age between 20 to 55 years.
- Willing to participate.
- Who Works for at least 8 hours.

### *Exclusion Criteria*

- Pregnant females.
- Recent history of surgery (last three months).
- Recent history of fracture (last three months).
- Participants who have systemic problems (diabetes, malignancy, hepatitis).

*Data Collection Procedure*

The study was done following the approval of the AHS research review board of *Iqra* national university Peshawar and the Chief executive officer (CEO) of bus rapid transit Peshawar. According to inclusion and exclusion criteria, recruitment was done. The first aim and procedure of the study were briefly explained, and then the consent form was given to each participant and adopted after that questionnaire.

*Data Collection Tool*

Nordic musculoskeletal questionnaire (NMQ) and Demographic data were collected through a questionnaire by making slight changes in standard questionnaire.

*Data Analysis Procedure*

Statistical data were analyzed by SPSS version 25; demographic data were analyzed through descriptive statistics.

**Results**

*Age Categories*

Out of 334, the highest frequency is n=106(31.7%) in the age group 19-24 years, followed by n=103(30.8%) in the age group 25-30 years, n=61(18.3%) in the age group 31-36 years, n=38(11.4%) in the age group 37-42 years, n=17(5.1%) in the age group 43-42 years, n=7(2.1%) in the age group above 48 years and n=2(.6%) in the age group 18 years as shown in the table below (Table 1 Figure 1).

*Gender Categories*

Out of 334 participants n= 296(88.6%) were male, and n= 38(11.4%) were female, as shown in the table below (Table 4, Figure 4).

*Occupation/specialty*

Out of the total 334 participants, the driver was 75(22.5%), security guards 126(37.7%), sweepers 80(24%) and ticketing managers 53(15.9%), as shown in the table below (Table 3, Figure 3).

*Body mass index*

Descriptive analysis showed that out of 334, n=209 in category 18.5-24.9(normal) followed by n=69 in category 25-29(overweight), n=34 in category <18.5(underweight), n=18 in category 30-34.9(obese) and n=4 in category >35(extremely obese) as showed in the Table 4 and Figure 4.

*Musculoskeletal pain*

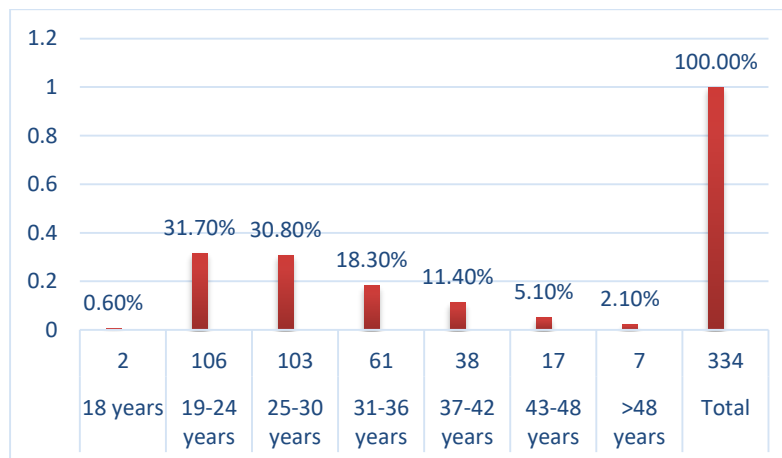
Out of 334 participants, n=203 have no pain, and n=131(39.2%) have musculoskeletal pain, as shown in the Table 5 and Figure 5.

*Location/Area of pain*

Out of 334 participants n=37(11.1%) knees followed by n=34(10.2%) low back, n=17(5.1%) ankle/feet, n=15(4.5%) neck, n=11(3.3%) shoulder, n=6(1.8%) upper back, n=5(1.5%) hip/thighs/buttocks, n=4(1.2%) wrist/hands, n=2(.6%) in the elbow as showed in the Table 6.

**Table 1***Age Categories frequency*

	Frequency	Percent
18 years	2	0.6%
19-24 years	106	31.7%
25-30 years	103	30.8%
31-36 years	61	18.3%
37-42 years	38	11.4%
43-48 years	17	5.1%
>48 years	7	2.1%
Total	334	100.0%

**Figure 1: Age categories frequency****Table 2***Gender Frequency and Percentage*

	Frequency	Per cent
Male	296	88.6%
Female	38	11.4%
Total	334	100.0%

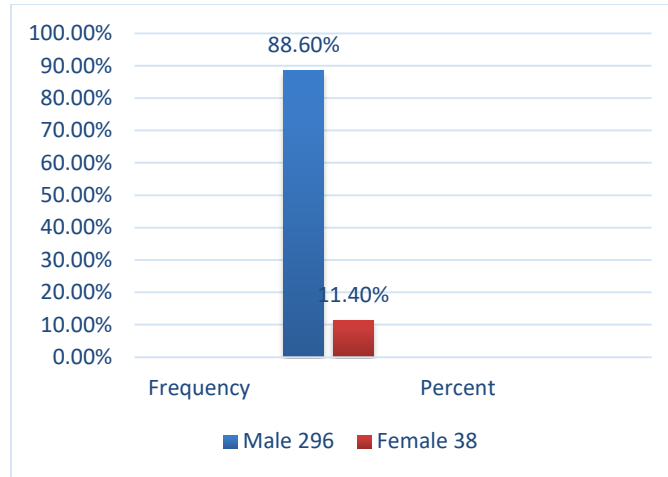


Figure 2: Gender frequency and percentage

Table 3

Occupation frequency and percentage

	Frequency	Per cent
Drivers	75	22.5%
Security guards	126	37.7%
Sweepers	80	24.0%
Ticketing managers	53	15.9%
Total	334	100.0%



Figure 3: Occupation Frequency And Percentage

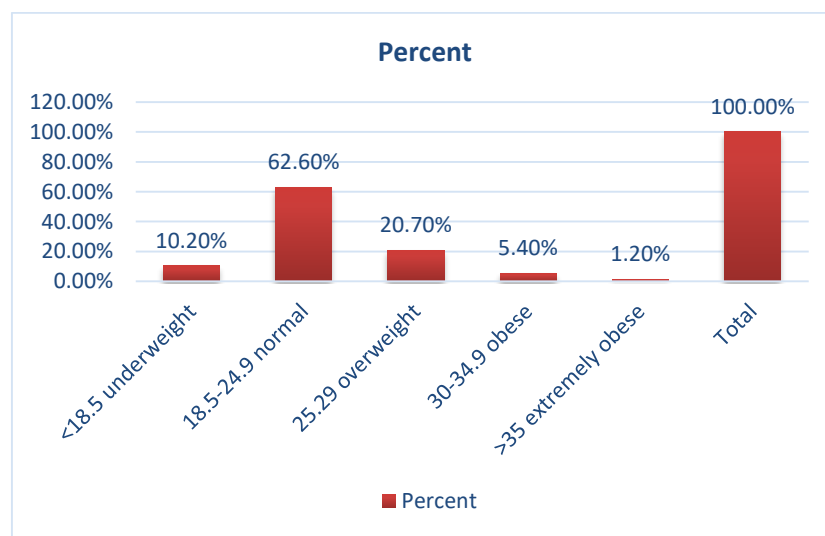
*Factors that contribute to work-related musculoskeletal disorder*

Out of 130 participants, n=35 worked in awkward or cramped positions, followed by n=35 not enough rest breaks during the day, n=31

performing the same task over and over, n=12 working in the same position for long periods, n=7 repetitive movements of the upper limb, n=6 work scheduling, n=3 continuing toward despite of injury or pain and n=1 inadequate training in injury prevention as shown in the Table 7.

**Table 4**  
*Body mass index frequency and percentage*

	<b>Frequency</b>	<b>Percent</b>
<18.5 underweight	34	10.2%
18.5-24.9 Normal	209	62.6%
25.29 overweight	69	20.7%
30-34.9 obese	18	5.4%
>35 extremely obese	4	1.2%
<b>Total</b>	<b>334</b>	<b>100.0%</b>



**Figure 4: Body mass index frequency and percentage**

**Table 5**  
*Musculoskeletal Pain frequency and percentage*

	<b>Frequency</b>	<b>Per cent</b>
Yes	131	39.2%
No	203	60.8%
<b>Total</b>	<b>334</b>	<b>100.0%</b>

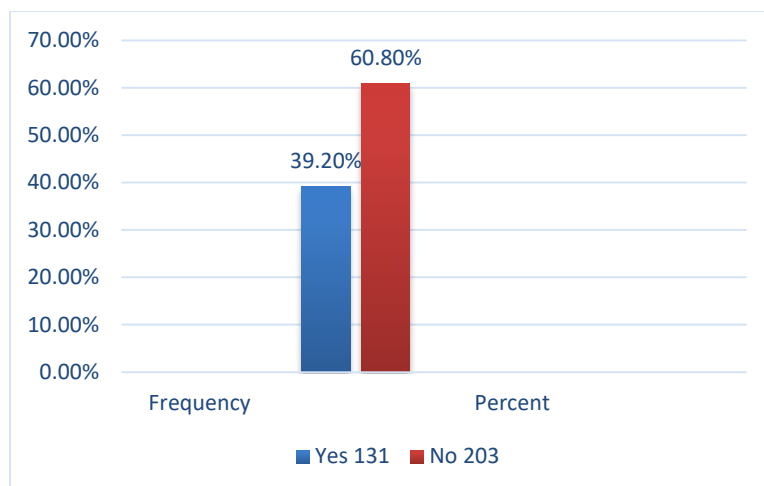


Figure 5: Musculoskeletal Pain frequency and percentage

Table 6  
Location/Area of Pain frequency and percentage

	Frequency	Percent
Neck	15	4.5%
Shoulder	11	3.3%
Elbow	2	.6%
upper back	6	1.8%
low back	34	10.2%
wrist/hands	4	1.2%
hip/thighs/ buttocks	5	1.5%
Knees	37	11.1%
ankle/feet	17	5.1%
Total	131	39.25
Total	334	100.0%

#### Occupation and location of pain

Data analysis showed common musculoskeletal problems in participants n= 18 knees, followed by n=16 low back, n=9 ankle/feet, n=5 neck, n=4 shoulder, n=2 hip/thighs and n=1 wrist/hands. Out of the total, 31 drivers experienced n= 10 neck pain, n=6 low back n=5 knees, n=3 shoulder, n=2 upper back, thighs and ankle/feet and n=1 wrist/hand. Among 51 security guards, n=18 experienced knee pain, n=16 low back, n=9 ankle/feet, n=3 shoulder, n=2 elbow and upper back and n=1 hips/thighs/buttocks. Out of total 30 sweepers, n=12 have knee pain, followed by n=10 low back, n=4 shoulder and n=2 wrist/hands and ankle/feet.



Among 19 ticketing managers, n= 5 experienced neck pain, n=4 ankle and feet pain, n=2 upper back, low back, hip/thighs/buttocks and knee pain and n=1 shoulder and wrist/hand pain, as shown in the table below (Table 8).

**Table 7***Factors contribute to your work-related musculoskeletal disorder frequency*

	Frequency	Per cent
performing the same task over and over working and	31	9.3%
awkward or cramped position	35	10.5%
working in the same position for long periods	12	3.6%
repetitive movements of the upper limb	7	2.1%
not enough rest breaks during the day	35	10.5%
continuing in despite of injury or pain	3	.9%
work scheduling (overtime, irregular shift, length of workday)	6	1.8%
inadequate training in injury prevention	1	.3%
Total	130	38.9%
Total	334	100.0%

## Discussion

Musculoskeletal disorders affect the human body's musculoskeletal system, which can be caused by any strain, sprain or muscular dystrophies/atrophies, repetitive movements, or any other pathology. This study was done on BRT staff, such as drivers, sweepers, ticketing managers and security guards. The study includes both males and females who are willing to participate. There is no literature about the prevalence of musculoskeletal disorders among BRT staff in Peshawar Khyber Pakhtunkhwa. Our study aims to determine the prevalence of the musculoskeletal disorder among BRT drivers, security guards, sweepers, and ticketing managers.

The finding of our study shows the highest prevalence of musculoskeletal disorder in sweepers (40%), followed by security guards (35.29%) and drivers (32.2%). The analysis shows that most common musculoskeletal disorder in overall staff was knees (11.1%), followed by

low back (10.2%), ankle/feet (5.1%), neck (4.5%), shoulder (3.3%), upper back (1.8%), hip/thighs/buttocks (1.5%), wrist/hands (1.2%) and elbow (6%).

**Table 8**  
*Occupation and Location of Pain Cross tabulation*

		Location of Pain								Total	
		Neck	Shoulder	Elbow	upper back	low back	wrist/hands	hip/thighs/buttocks	Knees	ankle/feet	
Occupation	Drivers	10	3	0	2	6	1	2	5	2	31
	security guards	0	3	2	2	16	0	1	18	9	51
	Sweepers	0	4	0	0	10	2	0	12	2	30
	ticketing managers	5	1	0	2	2	1	2	2	4	19
Total		15	11	2	6	34	4	5	37	17	131

The result of our study shows a high prevalence of sweepers (40%). The finding of our research shows that the area most frequently affected in sweepers was the knees (40%). The prevalence of musculoskeletal disorders in sweepers in other studies contradicts the results of our research. A cross-sectional study which was done on street sweepers in India in 2016, the result of the study showed that the prevalence of the musculoskeletal disorder is significantly higher in the shoulder(32%), wrists/hands(29%), elbow(27%) and neck(17%)(Salve & Chokhandre, 2016).

Another cross-sectional study which was conducted on female building sweepers in India in 2015, the results of the study showed that the area which is commonly affected was the arm(93.33%), shoulder (91.67%), hands/wrists(85%) and low back(83.33%), (Malhotra & Chauhan). They work in standing and awkward positions for longer periods and use long-handled brooms. It can also bend the body during sweeping which causes prolapse of knee joint cartilage and lead to knee pain. The result of our study shows that the area which are commonly affected in security guards was knee (35.29%), low back (31.37%), ankle/feet (30%), shoulder (5.8%), elbow, upper back (3.9%), hips/thighs/buttock (1.96%) respectively. The prevalence of musculoskeletal disorders in security guards is also higher in other studies compared to our study's results.

A comparative cross-sectional study was carried out on the Swedish Armed forces, i.e. soldiers from 2002-2012; the result of the study showed that the knee was the most common site for musculoskeletal disorders(Halvarsson et al., 2019). Another cross-sectional survey was conducted in *Hayatabad*, Peshawar (Pakistan) from

February, 2020- August, 2020. The finding of the study showed that the areas which are commonly affected are the lower back (29.7%) and knees (15.8%)(Khalid et al., 2021). It is because they stand for a longer time; therefore, all force exerts on the lower limb mainly occurs on the knee joint.

This study's finding shows that the driver's most commonly affected area was neck pain. The prevalence of musculoskeletal disorders is also higher in other studies than in our study's results. A cross-sectional study was conducted on a professional bus driver in the United Kingdom(UK) in 2020. According to the study, the prevalence rate of musculoskeletal disorder is higher in the driver, which affects the different areas of the body; most commonly, it affects the low back(53%), neck(42%.4), and shoulder (39.2%)(Joseph et al., 2020). Another study which is conducted on occupational drivers in Ibadan, Nigeria, in 2011, the outcome of the study showed that the typical site for pain is low back(64.8%), shoulder(30.8%), knees(27.0%) and the neck(17.0%)(Akinpelu et al., 2011). It is because it looks straightforward, which can lead to muscle instability, there is no support for the neck region, no proper rest break, and bad ergonomics.

The finding of this study shows that those participants (n= 79) with normal BMI (18.5-24.9 normal) have a high prevalence of musculoskeletal disorders (209%). It shows that musculoskeletal disorders affect individuals with average BMI more commonly. According to the study conducted to find out the relationship between body mass index and the musculoskeletal system 2013, the result of the study showed that high body mass index is associated with musculoskeletal disorder(Viester et al., 2013). It is because most of the participants in our research are younger. In this study, most participants were male and had a higher prevalence of (296%) musculoskeletal disorders than females (38%). Other studies contradict the result of our research.

A cohort study was conducted on the Dutch general population at the Netherlands in 2006; a study showed that the prevalence rate of musculoskeletal disorders is higher in females (45%) as compared to men (39%) by location of pain(Wijnhoven et al., 2006). It is because most of the participants were male, and there are cultural barriers for women. Regarding the description of symptoms, this study's result shows that most participants have pain followed by stiffness. The result of our study supported a survey done by Bard Natvig et al. in 2009; the results of the study showed that the majority of respondents (85.1%) reported pain symptoms (Natvig et al., 1995).

The result of the present study shows that the significant factor contributing to musculoskeletal disorders is working. Awkward or cramped position followed by not enough rest breaks during the day, working in the same position for extended amounts of time, repetitive upper-limb movements, work scheduling, continuing toward despite of injury or pain, inadequate training, in injury prevention. The result of our study supported by a study which was done by A.c.Botta et al. in 2018 showed that the most common factors that can lead to musculoskeletal disorders are working and awkward or cramped positions(Botta et al., 2018). Another cohort study, which was done by Bruno R. da Costa et al. in 2010, showed that the most common factors that can cause work-related musculoskeletal disorder are hefty lifting, awkward posture and excessive repetition(Da Costa & Vieira, 2010).

### **Conclusion**

The finding of this study shows that (n=131) participants out of 334 participants have musculoskeletal disorders; there is a high prevalence of the musculoskeletal disorder in security guards followed by sweepers. The most affected area in security guards is the knees (n=18), followed by low back (n=16), whereas, in sweepers, the most affected area is the knee (n=12), followed by low back (n=10). In contrast, in drivers most frequently affected area is the neck (n=10), followed by low back (n=6). Those participants whose BMI is normal are influenced mainly by the musculoskeletal disorder. Pain is the most typical sign, followed by stiffness with moderate frequency. The most common risk factor for the musculoskeletal disorder is working in an awkward or cramped position, followed by insufficient rest breaks during the day. Most medications are used for relieving symptoms, followed by physiotherapy.

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