



# INCIDENCE OF MUSCULOSKELETAL PAIN IN MUMBAI LOCAL TRAIN COMMUTERS

<sup>1</sup>Dr Vaagvi Joshi, <sup>2</sup>Dr Satish Pimpale, <sup>3</sup>Dr Pranjal Grover

<sup>1</sup>Intern (B.P.Th), <sup>2</sup>Associate Professor of NeuroPhysiotherapy Department, <sup>3</sup>Professor and Principal  
<sup>1</sup>Physiotherapy,

<sup>1</sup>TMV's Lokmanya Tilak College of Physiotherapy, Navi Mumbai, India

**Abstract:** This Local Train commuters in Mumbai face a tremendous amount of crowd while travelling in rush hours of the day, which usually leads to many commuters standing for the entire duration of travel in a cramped space or sitting in awkward postures, for a long time that over a course of period inevitably leads to musculoskeletal pain in some form or another. **Objective:** To find the joints and areas involved most commonly in local train commuters using Nordic Musculoskeletal Questionnaire and to have a gender biased discrimination on the joints involved. **Methods:** A cross sectional survey was conducted on 384 local train commuters in Mumbai. Dadar and Thane railway stations were targeted for recruitment of participants. Convenience sampling was used for the same. Both male and female participants above the age of 18, who had been travelling for more than a year and had a single travel route of an hour or more were included in the study. Nordic Musculoskeletal Questionnaire was used to collect the data. **Results:** A total of 384 responses were collected from local train commuters, amongst which 60% were female and 40% were male participants. 86% commuters experienced pain while 14% did not. Neck was the most affected area (37%) while elbow was the least affected (2%). The gender biased study pointed towards females having more cases of pain in each involved joint. **Conclusion:** The present study indicates that 86% Mumbai local train commuters have experienced a degree of musculoskeletal pain from travelling.

**Index Terms – Musculoskeletal pain, Mumbai Local Train Commuters**

## I. INTRODUCTION-

### Musculoskeletal Disorders-

Musculoskeletal disorders (MSDs) are soft tissue injuries typically caused by sudden or sustained exposure to repetitive motion, force, vibration, and awkward postures. They can affect the muscles, nerves, tendons, joint and even include multiple areas or systems as well. <sup>[1]</sup> Symptoms of MSD can include recurrent pain, stiff joints, swelling, and persistent aches. Depending on the severity of the MSD, it can even impinge on the daily tasks of a person like walking and typing.<sup>[1]</sup>

## **Mumbai Local Trains-**

Mumbai, being the commercial and financial capital of India, is the most populated city of the country. To handle this dense population, the city relies heavily on the use of public transportation with an estimated 48-52 % of daily commuters relying on the Mumbai suburban railways (local trains).<sup>[2,3]</sup> Around 7.7 million commuters use the suburban railways on a daily basis. The trains are optimized to carry around 1700-2000 people but these numbers increase up to 4700-5000 on average during peak/rush hours. This is termed as Super Dense Crush Load. Long distance travel can also contribute to Stress experience and sleep problems for workers and passengers (13-14) Both men's and women with long distance travel have reported poor mental health and psychological distress.<sup>[2,3,4]</sup> Delays of train generate the second highest levels of anxiety, which cause high levels of stress and anxiety.<sup>[5]</sup>

Repetitive movements, awkward postures and lack of space to even stand properly during the rush hours increase the chances of developing MSDs. Sometimes the commuters have to stand for the entirety of their journey due to the crowd which can cause further pain and discomfort.<sup>[5]</sup> Improper sitting and standing postures that are static, i.e. postures that are held for a long duration often times lead to MSD, pain and discomfort.<sup>[5]</sup> The problems faced by the commuters are loss of productive hours, personal human health along with increased stress, discomfort accidents and potential for physical injuries.<sup>[4,5,6]</sup>

## **Nordic Musculoskeletal Questionnaire**

Nordic Musculoskeletal Questionnaire was developed from a project funded by the Nordic council of ministers. The aim was to develop a standardized questionnaire methodology.<sup>[7]</sup> Significantly higher frequencies of musculoskeletal problems were reported when NMQ was administered as a structured interview of an ergonomic or an occupational health scenario, than a general health examination.<sup>[7]</sup> The reliability of NMQ using a test re-test methodology found the number of different answers varied from 0 to 23%. Validity tested against clinical history and the NMQ found a range of 0 to 20% disagreement.<sup>[7]</sup> The authors of the research (Joanne O Crawford et al) concluded that this was acceptable in a screening tool.<sup>[7]</sup>

## **II. NEED FOR STUDY-**

There is not enough study on the incidence of musculoskeletal pain and discomfort on local train commuters in Mumbai. The train system is aptly named as the lifeline of the city, as a large amount of the population of the city depends on it to reach to their work places and education institutes. However, most of these commuters travel in the rush hour and are caught up in the excessive crowds, and ultimately have to compromise their physical health to reach work places and back home. This leads to physical as well as mental stress on a person and decreases their productivity, output, and a reduced quality of life. Therefore there is a need to estimate the incidence of Musculoskeletal disorders in train commuters.

## **III. AIM**

To find the incidence of musculoskeletal pain in train commuters of Mumbai.

## **IV.OBJECTIVES-**

The purpose of the study was to find out the joints most commonly affected in Mumbai local train commuters and to have a gender biased comparison of the same.

## **V. METHODOLOGY-**

- Study Design: Cross Sectional Study
- Sampling Method: Convenience Sampling
- Sample Size: 384
- Study Setup: Dadar and Thane station
- Inclusion Criteria:
  1. Commuters that have been traveling for more than a year
  2. At least 1 hour of travelling in a single route
  3. Travelling during rush hours of 7-10 am and 5-8 pm
  4. At least 4 days travel in a week.
  5. Travelling in the first class coaches of the train.

- Exclusion Criteria:
  1. Commuters travelling in the afternoon or at night
  2. Jobs with prolonged standing or sitting (more than 6 hours)
  3. Recent surgery (within last 6 months)
  4. Handicapped population, congenital conditions, cardiovascular and/or neurological conditions
- Outcome Measures:
 

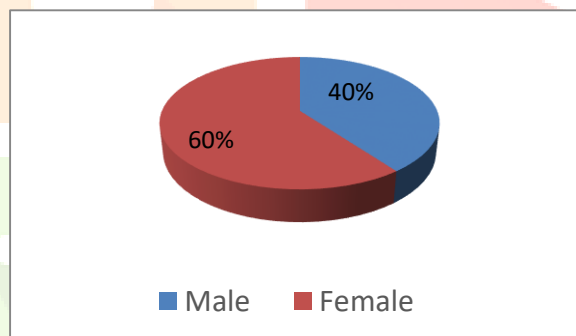
A Nordic Musculoskeletal Questionnaire

## VI. PROCEDURE-

A cross sectional study was conducted and 384 Mumbai local train commuters from Thane and Dadar railway stations participated in the study. Approval was obtained from the Institutional Ethics Committee of TMV'S Lokmanya Tilak College Of Physiotherapy, Kharghar. Purpose and the procedure of the study was explained to all the participants and informed consent was obtained. The subjects were interviewed and individual's demographic and travelling details were taken. The data was collected via Nordic Musculoskeletal Questionnaire and which was used to calculate the incidence of joint/area pain in the commuters. The data was analyzed with help of Microsoft excel. The frequency and percentage were calculated. The data were presented in the form of charts.

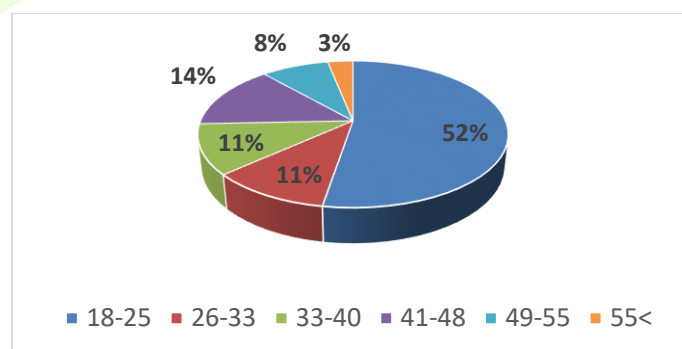
## VII. DATA ANALYSIS AND RESULTS-

A total of 384 commuters participated in the study, 60% were females candidates and 40% were males candidates.



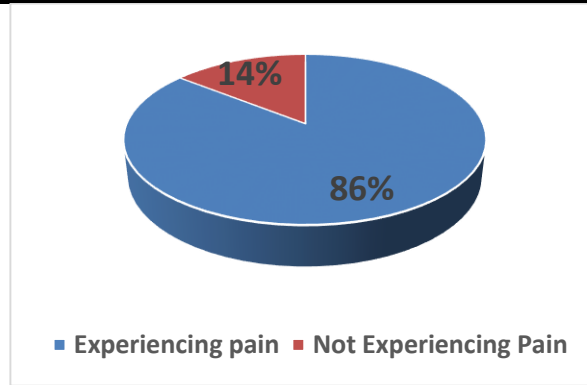
**Figure 1:** Gender wise distribution

Among 384 participants, maximum participation was from age range of 18-25 years of age (52%).



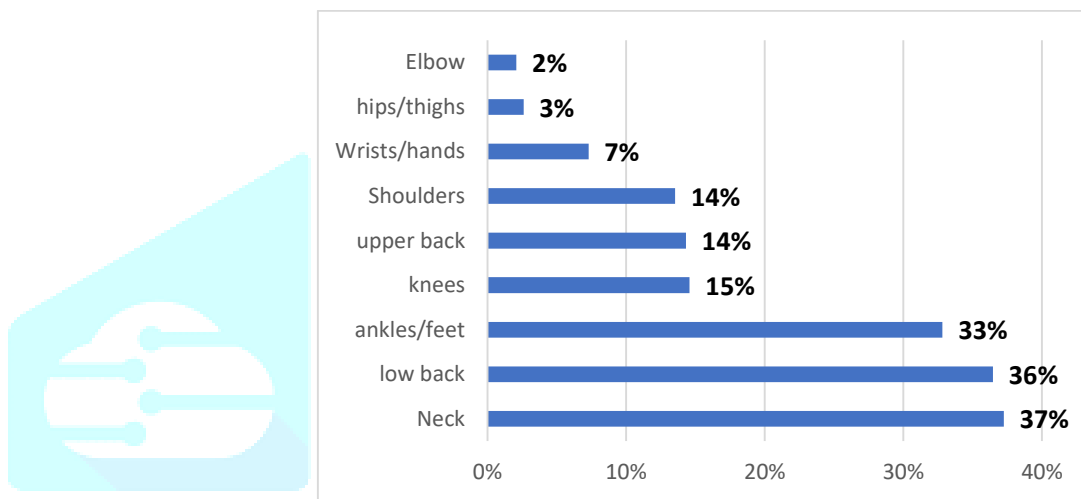
**Figure 2:** Age range distribution

Amongst the 384 participants, 86% experienced pain while the other 14% percent did not experience pain.



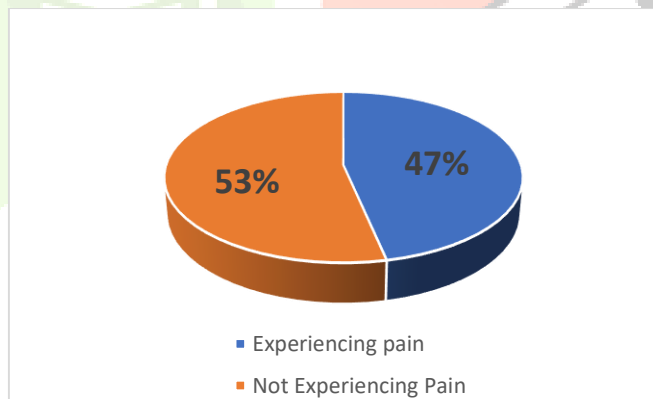
**Figure 3: Pain wise distribution**

The most affected area was neck at 37%, followed by low back at 36% and elbow at 2% and hips/thighs at 3%.

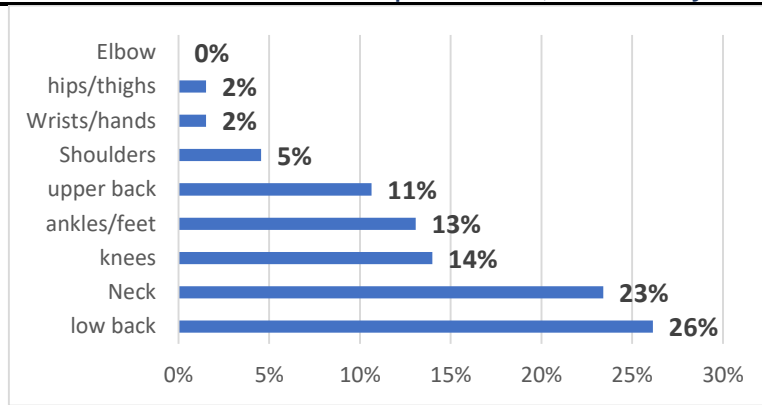


**Figure 4: Percentage of Joint Pain**

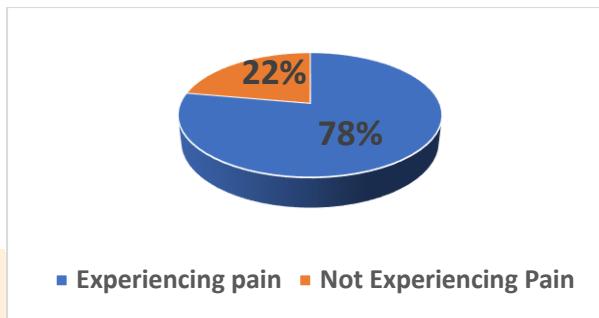
Amongst the commuters that said they experienced pain, 47% said that the pain prevented them from doing their normal amount of work.



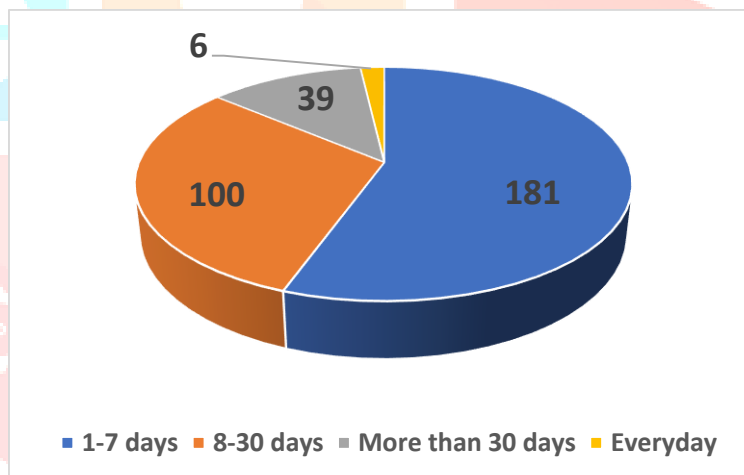
**Figure 6: Percentages of commuters that experienced pain preventing them from doing the normal amount of work.**



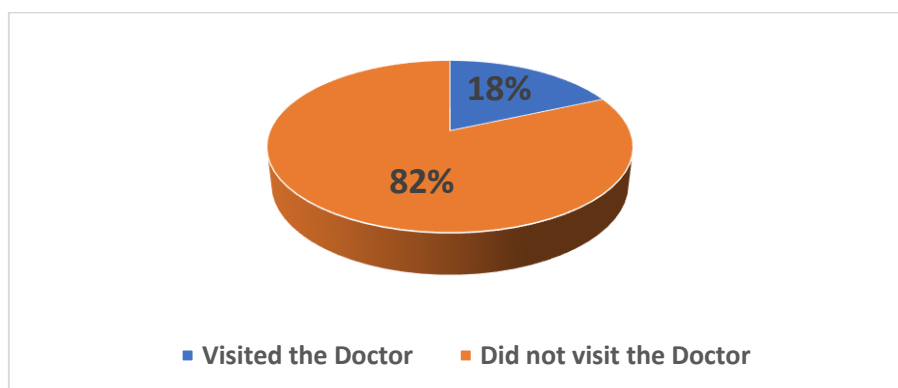
**Figure 7:** Above chart showcases the joints by percentages that were involved the most in pain that prevented the commuters from doing their normal amount of work.



**Figure 8:** Percentage of commuters that experienced pain in the last 7 days, from participating.

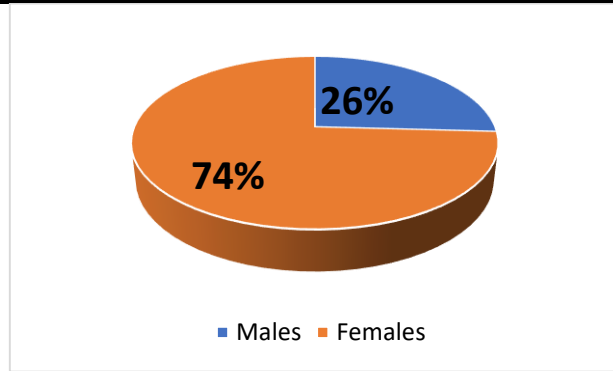


**Figure 9:** Number of days the pain lasted for the participants

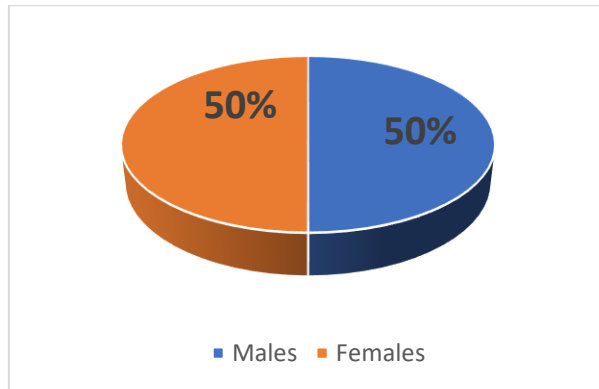


**Figure 10:** Percentage of commuters that visited the doctor for their pain

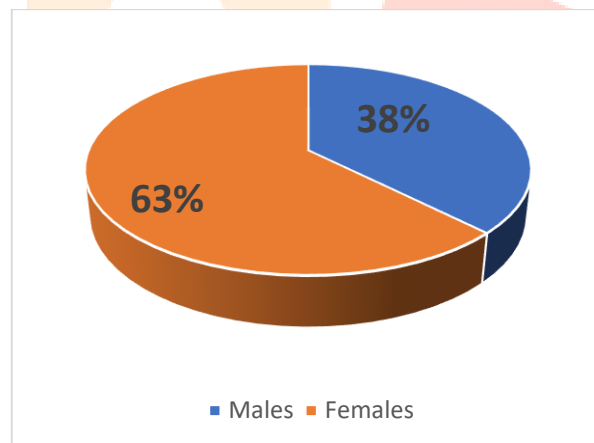
Pain in each joint, as reported by the commuters, was compared in the form of a gender biased chart, separately for each joint.



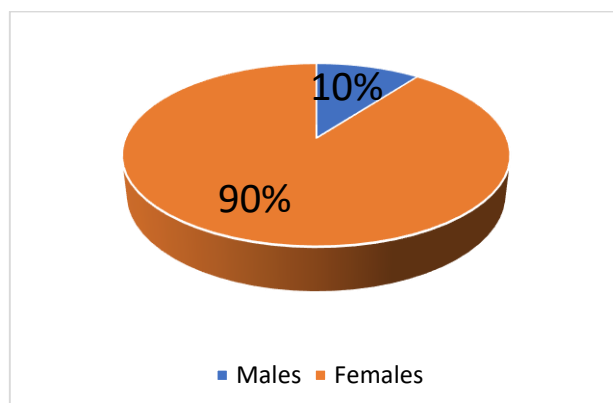
**Figure 11:** Neck Pain in Males vs Females



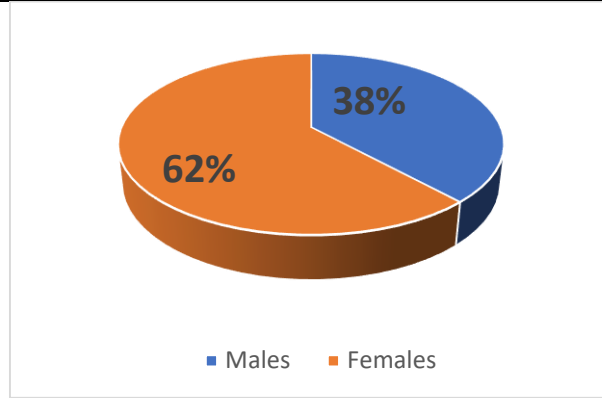
**Figure 12:** Shoulder Pain in Males vs Females



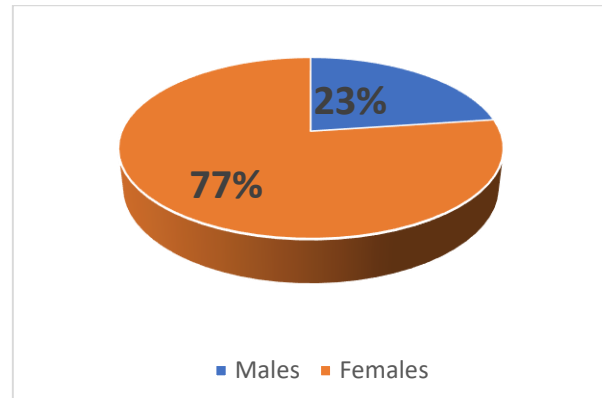
**Figure 13:** Elbow Pain in Males vs Females



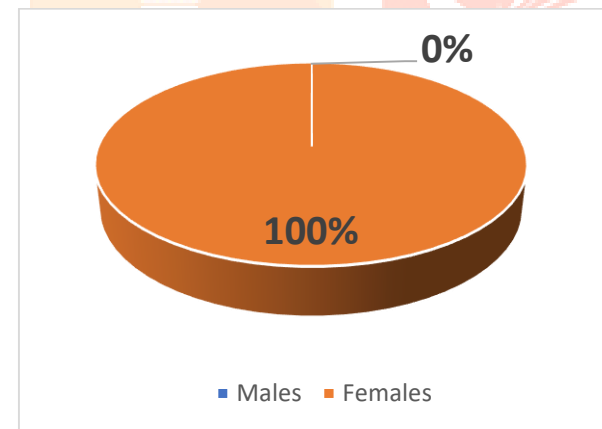
**Figure 14:** Wrist/Hands Pain in Males vs Females



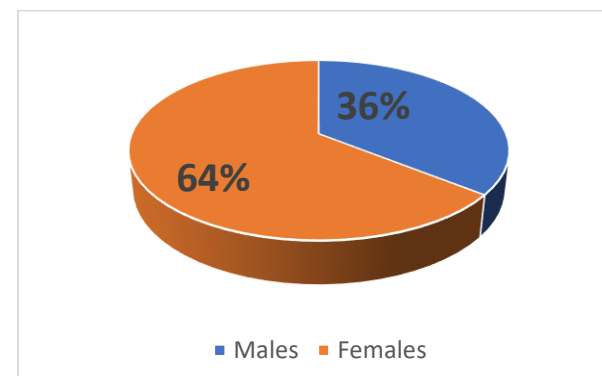
**Figure 15:** Upper Back Pain in Males vs Females



**Figure 16:** Low Back Pain in Males vs Females

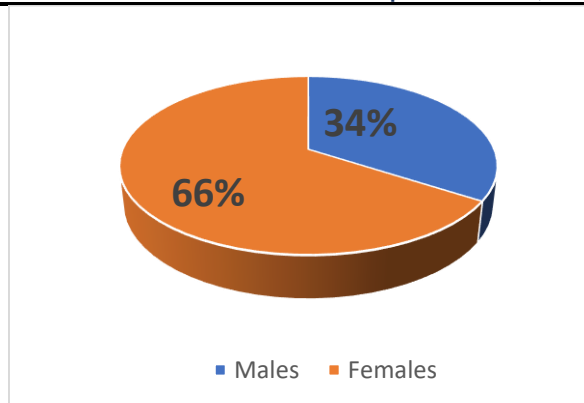


**Figure 17:** Hips/Thigh Pain in Males vs Females



**Figure 18:** Knee Pain in Males vs Females





**Figure 19:** Ankles/Heel Pain in Males vs Females

## VIII. DISCUSSION-

The goal of our study was to determine the incidence of musculoskeletal pain disorders in local train commuters using Nordic Musculoskeletal Questionnaire and determine a gender biased comparison on the affected joints.

A total of 384 participants voluntarily participated in the study, participants that did not travel during peak hours since a year and did not have a minimum one hour single route travel were excluded from the study. Participants with any longstanding musculoskeletal disorders and systemic illnesses were also excluded. We chose people travelling in first class compartments since they are significantly smaller in area, which as a result increases the super dense crush load during the prime rush hours where the crowd increases significantly. This would tend to lead to more musculoskeletal disorders due to awkward postures in a small place with most commuters standing for the entire length of travel.

We used Nordic Musculoskeletal Questionnaire for the purpose of our study, it had six specific questions related to pain felt over the body, with yes/no screening questions and has a good test-retest reliability of 0.90. Using the Nordic Musculoskeletal Questionnaire also gave us a brief overview and idea about participant pain over the past 12 months and is easy to administer and understand.

According to the results of the study, 86% of the commuters experienced some type of musculoskeletal pain over the last 12 months. The highest reported pain was in the neck area (37%), followed by low back (36%) and thirdly in the ankles/feet (33%) region. The least amount of pain was reported in elbows (2%) followed by hips and thighs (3%). 47% of participants reported that the pain they experienced prevented them from performing their normal level of work. 78% participants experienced pain in the last seven days. 181 participants reported that their pain lasted less than a week, a 100 said their pain lasted within 30 days, 39 said their pain lasted more than 30 days while only 6 reported that their pain lasted every day. Only 18% participants visited a doctor for their pain.

The gender biased study revealed that females had a higher percentage of pain than males at all joints and equal pain percentage

was the most affected joint in females (106 commuters), followed by low back (100) and ankles/feet (83). Ankles/feet was the most affected in males (43 participants) followed by neck (37) and low back (32).

Commuters carry their heavy bags in front that provides pressure on neck and low back areas, which contributes to pain over time. Constant overhead holding of the railings, sitting/standing in awkward postures, viewing mobile phones also leads to pain over time which leads to poor body biomechanics. Due to overcrowding, there is less space for feet movement with them being in long static posture and the inability to stretch that also leads to pain.

Pushing and pulling in the train while standing and even while sitting near the open spaces and while alighting and boarding off the train can also lead to musculoskeletal pain. Slouched postures, sitting in small spaces, twisting and sudden jerky movements can all contribute further to the pain.

Some other factors that lead to pain are microtear in ligaments (of back, feet), overuse of muscles and repetitive translatory movement.

The study offers an overview of prevalence of musculoskeletal pain in local train commuters over a twelve month period in a brief and concise manner.



## IX. CONCLUSION-

We concluded that 86% of local train commuters experience musculoskeletal pain while traveling/due to local train travel. Amongst them, 47% of commuters were unable to perform their normal level of work and 78% experienced pain in the last seven days.

High incidence of pain was reported in neck (37%), low back (36%) and ankles/feet (33%) while least incidence was reported in elbows (2%) and hips/thighs (3%).

The gender biased study revealed that females had a higher percentage of pain than males at all joints except equal pain percentage at shoulder joints. Neck was the most affected joint in female (106 commuters), followed by low back (100) and ankles/feet (83). Ankles/feet was the most affected in males (43 participants) followed by neck (37) and low back (32).

## X. LIMITATIONS-

The present study has certain limitations. While NMQ is a valuable tool to assess musculoskeletal symptoms quickly, it has certain limitations as well. While it helps to identify the presence and frequency of musculoskeletal symptoms, it does not provide information on the causes of the symptoms. The test is also memory recall based where participants were made to remember their symptoms over a year back, which can lead to discrepancy in actual results if participants overestimate or underestimate their symptoms.

While it assesses the musculoskeletal symptoms related to specific areas, it does not necessarily capture symptoms related to other body areas or systemic health issues.

## XI. ACKNOWLEDGEMENTS-

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