MUSCULOSKELETAL DISORDERS AND ASSOCIATED FACTORS AMONG MANUAL WORKERS IN RAILWAY WORKSHOPS IN RANGPUR DIVISION, BANGLADESH

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We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled

MUSCULOSKELETAL DISORDERS AND ASSOCIATED FACTORS AMONG MANUAL WORKERS IN RAILWAY WORKSHOPS IN RANGPUR DIVISION, BANGLADESH

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This study with the title- **"Musculoskeletal disorders and associated factors among manual workers in railway workshops in Rangpur division, Bangladesh"** by **Md. Abdullah Al Mamun,** Department of physiotherapy, Saic College of Medical Science and Technology, was done in my close supervision and direct guidance. I have gone through the papers. This is up to my full of satisfaction

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DECLARATION

This work has not previously been accepted in substance for any degree and isn't concurrently submitted in candidature for any degree. This dissertation is being submitted in partial fulfillment of the requirements for the degree of B.Sc. in Physiotherapy.

I confirm that if anything identified in my work that I have done plagiarism or any form of cheating that will directly awarded me fail and I am subject to disciplinary actions of authority. I confirm that the electronic copy is identical to the bound copy of the Thesis.

In case of dissemination the finding of this project for future publication, research supervisor will highly concern, it will be duly acknowledged as graduate thesis and consent will consent taken from the physiotherapy department of Saic College of Medical Science and Technology (SCMST).

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CHAPTER – I INTRODUCTION

1.1 Background

The musculoskeletal system's key duties include facilitating movement, providing protection, providing support for the body, and ensuring homeostasis. Muscle contraction can be decreased by exhaustion, extended loading, inadequate oxygen, and repetitive activity. A lack of rest increases the chance of injury. Reduced motor function, pain and inflammation in bodily tissues (such as muscles, tendons, and nerves), or discomfort in the muscles and bones as a result of repeated motions and constant physical exertion are all examples of musculoskeletal disorders (MSDs) (Ou et al., 2021).

Muscles, tendons, ligaments, joints, nerves, and cartilage are all affected by musculoskeletal disorders (MSDs). MSDs are characterized by continuous aches, pains, or discomforts, and they frequently lead to movement restrictions that impair the affected person's capacity to work and be productive (WHO., 2022). MSDs typically have a connection to the workplace and affect people's health status, quality of life, and ability to function efficiently (Bihari et al., 2011).

The World Health Organization has divided work related musculoskeletal disorders (WMSDs) into two different categories: acute injuries and chronic injuries. Acute injuries are those that have happened lately and might need medical attention right away. Depending on the type and degree of the injury as well as whether or not it affects performance at work, receiving care from a health care professional is also recommended for chronic injuries, which develop gradually over time and cause persistent soreness and discomfort in the body. The financial cost of WMSDs and MSDs is significant. In their 2018 safety index, Liberty Mutual Insurance stated that 13.7 billion dollars were spent on occupational injuries due to overexertion in 2017. Physical therapists can use education, ergonomics training, workplace safety improvements, exercise prescription and monitoring, and hands-on manual therapies to prevent and treat musculoskeletal problems in the general population. In order to save expenses for companies, increase

workplace productivity, lower WMSDs, and lower overall employee absenteeism, ergonomics is defined as preparing the worker to be able to execute job activities safely.

It has been demonstrated that on-site physical therapy care, including ergonomic education, training, and exercise, is incredibly cost-effective. Employees who receive treatment locally spend a lot less on medical expenses than those who receive it outside (Prall et al., 2019).

Injuries affecting tendons, ligaments, muscles, bones, and cartilage are referred to as musculoskeletal ailments. Musculoskeletal diseases related to work. Link between WMSDs and hard lifting, violent activity, uncomfortable posture, repetition, and full body vibration has been discovered by epidemiological investigations. Injuries, missed work, and higher production expenses are the outcomes of WMSDs. When it comes to how frequently they impair quality of life, they rank highest among health issues. About 29% of absence that results in workplace injury in the US is caused by WMSDs. In the UK, a worker with a WMSD missed 15 days of work on average between 2013 and 2014. In addition to causing bad health, WMSDs also raise expenses for employers, individuals, and society as a whole (Sarkar et al., 2016).

One of the most significant occupational illnesses in the world is musculoskeletal disorders (MSD). These types of illnesses are the most common causes of sick leave in Europe and Spain (Gomez-Galan et al., 2021). In the world, musculoskeletal conditions account for the second most common cause of disability. Additionally, it causes a decline in pay for employers and the health care system, as well as an increase in worker absenteeism. Between 1990 and 2010, the rates of disability resulting from chronic musculoskeletal illnesses increased by 45%, and this upward pattern may continue. A large portion of the population is impacted by the rate of musculoskeletal discomfort. Employees will become more conscious of their pain level, type, degree of involvement in work, and financial difficulties as a result of musculoskeletal pain symptoms. The risks associated with musculoskeletal illnesses are divided into three groups: biomechanical risks, extra risks, and individual risks. In addition to vibration, temperature, and contact stress, biomechanical dangers include excessive force, repetition, and uncomfortable

posture. Individual hazards are influenced by factors such as age, body size, genetic susceptibility, and past injuries (Kanniappan et al., 2020).

Work related musculoskeletal disorders (WMSDs) are among the most serious occupational hazards in many industries (Tinubu et al., 2010). In many societies, musculoskeletal problems have been identified as a growing burden. Health policy makers and other experts look for appropriate nationwide systems for reporting and preventing musculoskeletal problems. Work-related factors include awkward positions and repetitive duties; work-related risk factors for musculoskeletal disorders include age, gender, and psychological characteristics. Work-related disorders were a major source of issues in developing nations. The present opinion is that the effects of musculoskeletal illnesses are greater on society and industries than on individual workers (Aghilinejad et al., 2012).

In many nations, musculoskeletal disorders (MSDs) are common, expensive, and negatively affect people's quality of life. MSDs can develop at rates up to three or four times greater than the general incidence in specific sectors and occupations. Air travel, mining, food processing, nursing homes, tanning leather, and heavy and light manufacturing (automobiles, furniture, appliances, electrical and electronic goods, textiles, clothing, and shoes) are among the most dangerous sectors (Punnett et al., 2004).

WMSDs causing absences from work, inadequate performance and a degradation in quality of life (Wang, 2019; Vasconce, 2019). WMSDs lead to disabilities, wasted work time, and higher production expenses (Kirkhorn et al., 2010). The quality of life is significantly impacted by musculoskeletal disorders (MSDs), which also place a significant financial burden on society in the form of compensation expenses, reduced income, and productivity. MSDs are a significant public health concern in both developed and developing countries (Reddy et al., 2015).

Among working populations, WMSDs are one of the main causes of disorders that limit their activities. They have a major effect on people's socioeconomic status and quality of life. Expenses associated with these diseases increase for employees, companies, and society as a whole. According to estimates from the International Labor

Organization (ILO), 2 million men and women worldwide suffer to work-related illnesses each year, which amounts to more than 5,480 deaths each day (Tamene et al., 2020).

Osteoarthritis, cervical spondylosis, and low back pain are among the most common MSDs. The total cost of disease for such conditions is approximately 23%. The primary risks associated with these tasks are (a) frequent lifting and carrying of loads; (b) forceful lifting and carrying of heavy loads; (c) awkward postures (bending and twisting); (d) accumulation of pressure points with loads that have sharp edges; and (e) prolonged static postures. Initially, there may be discomfort and exhaustion with repeated or continuous exposure to any of these risk factors. The length of time a worker has been exposed, the frequency with which risk variables are encountered, and the intensity of those contacts all influence the worker's risk level. Workers are at risk of injuries to their hands, wrists, backs, necks, and other body parts repeatedly. Previous studies had looked at the relationship between MSDs and demographic traits in a variety of occupations. The Nordic standardized questionnaire is the most widely used instrument for researching the prevalence of MSD disorders in all sectors of occupation. It can be applied with easily in interviews or self-administered interviews and is appropriate for looking at past musculoskeletal issues in individuals in the workplace. It is important to remember that this depends on the research population's recall memory because it asks for symptoms and problems that were experienced during the previous 12 months (Khan et al., 2018).

The prevalence and severity of musculoskeletal disorders among workers are both high (Fayaz et al., 2016). More than 40 million employees in Europe were afflicted by musculoskeletal diseases (MSD) in 2017, and MSD continued to be the main cause of disability globally in 2019 (Annual Activity Report & Musculoskeletal conditions., 2020).

More than 9% of adults worldwide are physically disabled as a result of musculoskeletal disorders (MSDs) (Oluka et al., 2020). MSDs are also the most prevalent occupational health issue in Europe, with 23% of employees in the European Union (EU) reporting muscular discomfort and 25% reporting backaches. The main reason for absence from work in EU Member States was MSDs (Schneider & Irastorza, 2010).

Different WMSD prevalence rates among workers were reported by epidemiological research on WMSDs that looked at multiple industries. The prevalence rates were 79% in Brazil's industrial sector, 41.5% in Iran's petrochemical industry, and 97.3% in India's textile sector, according to these studies (Tamene et al., 2020).

The study revealed that among manual material handling workers in Kolkata, India's central market area, the lower back was the most affected body part (68%), followed by the knee (63%), neck (56%) and shoulder (41%) (Sarkar et al., 2016). Various more studies involving manual material handling also yield results that are similar (Aghilinejad et al., 2012; Gangopadhyay et al., 2003; Gangopadhyay et al., 2006; Gupta and Ram., 1987).

According to the results of the Nordic musculoskeletal disorders questionnaire, Iranian steel workers had a one-week and 12-month prevalence of musculoskeletal disorders at any of the four body sites of the included workers of 46.3% and 61%, respectively (Aghilinejad et al., 2012).

The prevalence of WMSDs was 77.1% among sugar factory workers in Uganda (Aremu et al., 2022). The prevalence of WMSDs was at least one part of their body 47.7% among Vehicle Repair Workers in Ethiopia (Tamene et al., 2020). The Overall, prevalence of WMSDs among furniture manufacturing workers in China was 31.57% (Yang et al., 2022).

Studies on lower extremity MSDs have been conducted on a variety of workers, including those in manufacturing, construction, farming, nursing, and office settings. The manufacturing sector employs a huge number of people in these occupations, which are characterized by demanding physical labor, repetitive activities, and generally low salaries, particularly in developing nations. A significant amount of manufacturing industries have been moved to newly industrialized countries as a result of economic globalization (Jin et al., 2021).

As one example, Bangladesh Bureau of Statistics 2020 stated that in Bangladesh, number of manufacturing industries was 46110 and Total Person Engaged 5465162.

During the 2019 survey year, there were about 5.5 million people employed in the manufacturing industries in Bangladesh. Bangladesh is a developing and lower-middle income country (Developing Countries, 2022).

Bangladesh, as a developing nation, was placed seventh in the world for having an intensive labor force, according to the estimation from 2017. There are roughly 66.64 million people in the working population overall, with 20.5% of them employed in industrial sectors (CIA, 2022). As a result, lower extremity MSDs are a serious issue that requires increased attention in both developed and developing countries manufacturing sectors. Therefore, this study aimed to determine the prevalence of MSDs and associated factors among manual workers.

1.2 Justification of the study

MSDs are a serious issue that requires increased attention in developing countries manufacturing sectors. Work-related factors include (a) frequent lifting and carrying of loads; (b) forceful lifting and carrying of heavy loads; (c) awkward postures (bending and twisting); and (d) prolonged static postures. Bangladesh Bureau of Statistics 2020 stated that in Bangladesh number of manufacturing industries was 46110 and total person engaged 5465162. During the 2019 survey year, there were about 5.5 million people employed in the manufacturing industries in Bangladesh. Bangladesh Railway is a very important mode of inland transport, its healthy grow naturally contributes to the economic development of the country. Musculoskeletal problems among railway workers have been identified as a growing burden. Health policy makers and other experts look for appropriate nationwide systems for reporting and preventing musculoskeletal problems. In the manufacturing industries, the importance of a physiotherapist when it comes to ergonomics, worker health, MSDs and WMSDs prevention, get back to work initiatives, and manual intervention and prescription exercise. Positive Impact of Physiotherapy in the workplace: By reducing injuries, raising productivity, lowering absenteeism, and facilitating a quicker return to work for injured workers, ergonomic training, workplace safety and education, on-site physiotherapy treatments, including exercise and manual therapy, and return to work programs were advantageous to employers, employees and countries. It is important to ensure that payers, employers, employees and countries are awareness off the crucial role physical therapists can play in occupational health. Moreover, I have studied some previous studies and found that there are many studies on MSDs among railway workers outside the country (eg. India, Pakistan, China) but no studies related to them in Bangladesh. Such research is essential to improve the railway sector. So, I want to study on the MSDs and associated factors among railway workers of Bangladesh. Through, this study more researchers will be able to get information about railway workers and also government, railway ministry, NGOs' and policy makers will be able to take necessary steps to reduce the MSD problems and associated factors among railway workers in Bangladesh and realize the importance of physiotherapists in the manufacturing sector.

1.3 Research question

I. What is the prevalence of musculoskeletal disorders among manual workers in railway workshops in Rangpur division, Bangladesh?

II. What are the factors related to musculoskeletal disorders among manual workers in railway workshops in Rangpur division, Bangladesh?

1.4 Objectives

1.4.1 General objectives

To determine the prevalence of musculoskeletal disorders and associated factors among manual workers in railway workshops in Rangpur division, Bangladesh.

1.4.2 Specific objectives

I. To calculate the prevalence of musculoskeletal disorder among manual workers in railway workshops in Rangpur division, Bangladesh.

II. To find out the comorbidities among manual workers in railway workshops in Rangpur division, Bangladesh.

III. To determine Socio-demographic information among manual workers in railway workshops in Rangpur division, Bangladesh.

IV. To examine the association between musculoskeletal disorders and socio-demographic factors.

V. To examine the association between musculoskeletal disorders and work related information.

VI. To examine the association between musculoskeletal disorders and systemic disorder related information.

1.5 List of variable

1.5.1 Socio-demographic related variable

Age

Education level

Family type

Marital status

Monthly income

Religion

BMI

1.5.2 Work related variable

Working experience

Working time

Workplace activities

Posture while working

Exertion during the office time

Training after entering the job

1.5.3 Systemic disorders related variable

Cardiovascular system problems

Pulmonary problems

ENT problems

Metabolic syndrome

1.5.4 Musculoskeletal discomfort related variable

Neck pain

Shoulders pain

Elbows pain

Wrists/Hands pain

Upper Back pain

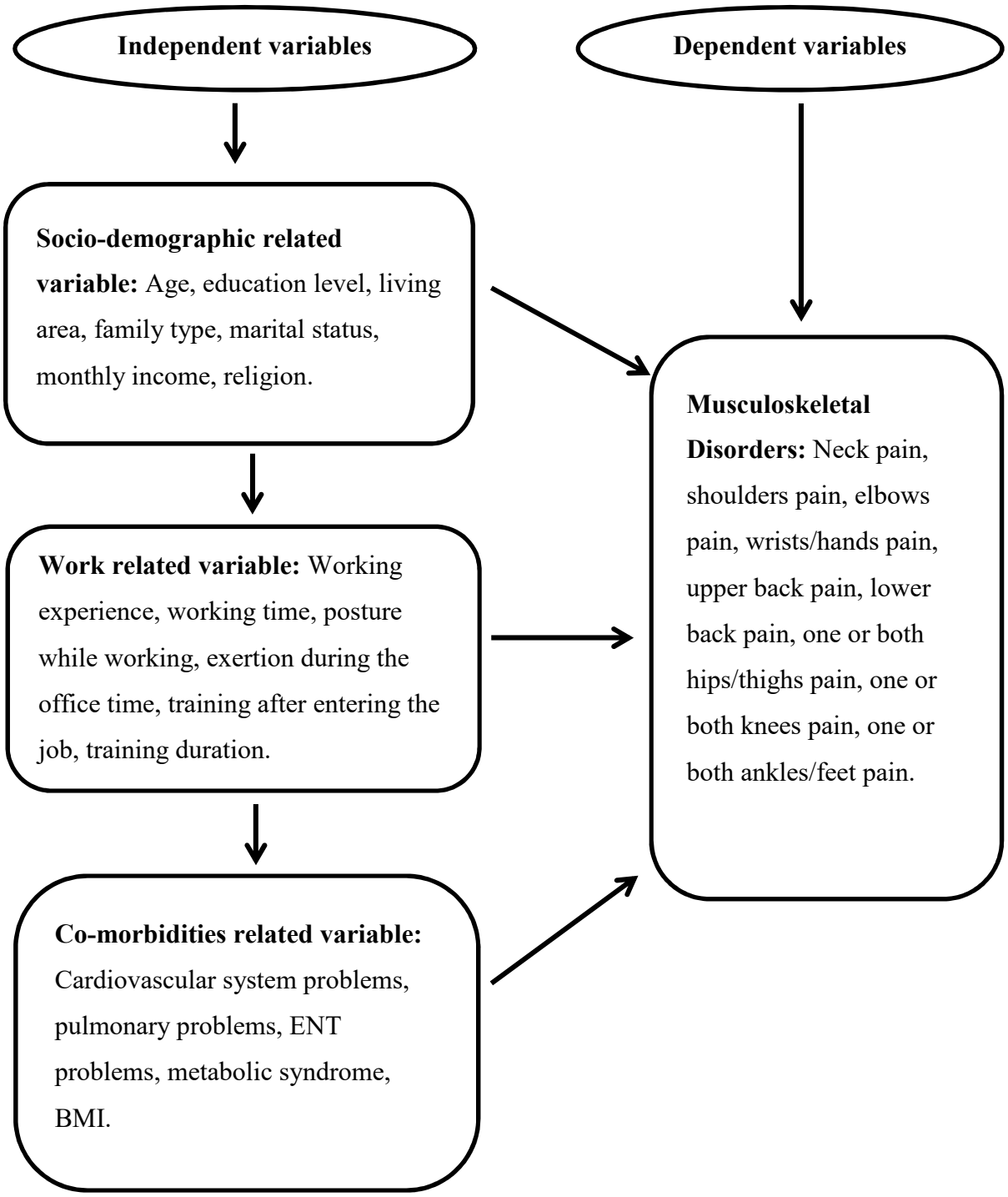
Lower Back pain

One or Both Hips/ Thighs pain

One or Both Knees pain

One or Both Ankles/Feet pain

1.6 Conceptual Framework



1.7 Operational definitions of the variables

Manual worker

Work involving the hands, as opposed to an office job (Collins English Dictionary, 2023).

Musculoskeletal Disorder

Musculoskeletal disorders comprise diverse conditions affecting bones, joints, muscles, and connective tissues (USBJI, 2014a).

Pain

Highly unpleasant physical sensation caused by illness or injury.

Working experience

Work experience is the experience an employee gains while working in a job, particular field or profession.

Working time

Working time is the period of time that a person spends at paid labor.

Working Posture

Working posture is the posture adopted by an employee while performing work tasks.

Exertion

The use of a lot of mental or physical effort.

Training

The process of learning the skills you need to do a particular job or activity.

Training duration

Training duration means the period over which the training services will be undertaken.

Cardiovascular system problems

Cardiovascular system problems is a general term that describes a disease of the heart or blood vessels.

Pulmonary problems

A type of disease that affects the lungs and other parts of the respiratory system.

ENT problems

ENT means Ear, Nose, Throat. Any disorder or trauma of Ear, Nose, Throat is called ENT problems.

Metabolic syndrome

Metabolic syndrome is the medical term for a combination of diabetes, high blood pressure (hypertension) and obesity.

Nordic musculoskeletal questionnaire

The Nordic Musculoskeletal Questionnaire (NMQ) can be used for the screening of musculoskeletal problems. The NMQ allows comparison of musculoskeletal problems in different body regions in epidemiological studies with large numbers of participants.

BMI

BMI means Body mass index.

Under weight: < 18.5 kg/m^2

Normal: 18.6-24.9 kg/m^2

Over Weight: 25-29.9 kg/m^2

Obese: > 30 kg/m^2

CHAPTER – II LITERATURE REVIEW

Injuries or pains that impact the musculoskeletal system of the body are referred to as musculoskeletal disorders (MSDs) (WHO., 2004). They contain cartilage, blood vessels, joints, bones, nerves, tendons, ligaments, and spinal discs. However, musculoskeletal conditions that are predominantly brought about or made worse by work, as well as by the impacts of the immediate environment in which work is performed, are known as work-related musculoskeletal diseases (WMSDs) (Punchihewa et al., 2015).

Among working populations, WMSDs are a major cause of disorders that limit their activities (Bevan et al., 2015). They significantly damage the socioeconomic status of persons affected and have an adverse effect on their quality of life. These illnesses increase expenses for businesses, employees, and society at large (Piedhahita et al., 2006).

This sample had a high frequency of reported MSDs, likely attributed to physiologically strenuous occupational activities repeated on average of 30–40 times daily. Ergonomic interventions, such as the use of handcarts, and occupational training are urgently needed (Sarkar et al., 2016).

Because their profession involves a lot of manual labor, agricultural laborers are more likely to develop musculoskeletal diseases. This study evaluates the physical health of Almería (Spain) pepper farming workers. Using the OWAS (Ovako Working Posture Assessment System) and RULA (Rapid Upper Limb Assessment) methodologies, the goal was to examine pepper cultivation tasks carried out in the Almería-type greenhouse. The OWAS data indicated that 53% of people had normal posture, 30% had medium risk, 16% had high risk, and 30% had extremely high risk. The legs and back were the most affected body parts. High risk/action levels were discovered by the RULA evaluation; 50% of the postures matched level 3, 35% to level 4, and 15% to level 5. High risk/action levels were discovered by the RULA assessment; 50% of the postures matched level 3, 35% to level 4, and 15% to level 2. Therefore, several improvements are suggested, such as task redesign, mechanization, training, team building, and enhancing the physical well-

being of the workforce. Workers don't seem to be limited in their ability to complete duties, and they don't typically request sick leave, therefore the OWAS and RULA statistics may have overstated the outcomes (Gomez-Galan et al., 2021).

According to the study's statistical analysis, 88% of sewing machine workers reported having lower back pain in the previous 12 months, 82% reported having lower back and knee pain that they were able to avoid during the previous 12 months while engaging in regular activities, and 86% reported having lower back pain within the previous seven days. According to this study, 86% of participants reported having low back pain, 84% reported having knee pain, and 74% reported having neck discomfort in the previous seven days. In the previous 12 months, 88% reported having low back pain, 86% reported knee pain, and 76% reported neck discomfort. Among sewing machine manual workers, 82% reported lower back and knee discomfort, and 72% reported neck pain that has affected them during the past 12 months. Among sewing machine manual workers, 82% reported lower back and knee discomfort, and 72% reported neck pain that interfered with daily activities over the previous 12 months (Kanniappan et al., 2020).

The mean age of the research workers was 37.23±8.74 years, based on the 1439 questionnaires that were returned out of 1984 persons. In the last week, 46.3% of workers and 61% of workers in the previous year reported having a musculoskeletal ailment. The most frequent musculoskeletal diseases were seen in the lumbar, knee, and neck regions. BMI and employment time of labor were significantly correlated with musculoskeletal problems. In Iran's steel industry, musculoskeletal diseases were common. Workplace ergonomic intervention tactics should be concentrated on removing environmental dangers such interruptions to work hours and heavy lifting (Aghilinejad et al., 2012).

Following correction, there were significant correlations between the number of rest breaks and the risk of MSDs (odds ratio [OR] 1.68 95% confidence interval [CI] 1.11e2.54) and WMSDs (OR 1.40 95% CI 1.01e1.96) among female kitchen workers. In all three anatomical regions, female kitchen workers' MSDs were substantially correlated with insufficient rest periods. The importance of rest periods as a workplace intervention

for avoiding MSDs in kitchen workers is emphasized by this study. Additional research is necessary to determine the cause of this association (Park et al., 2021).

The purpose of this study was to investigate the connection between nursing staff performance and musculoskeletal problems. The Nordic Musculoskeletal Questionnaire (NMQ), the Work Ability Index, and the Checklist for Musculoskeletal Disorders (MSDs) were used in this cross-sectional study to assess the prevalence of MSDs and their effects on 117 nursing staff members who worked in general wards, an intensive care unit, and an emergency department. The results show that there was a high risk of MSDs in the work environment for the nursing staff. Workers in the intensive care unit were especially vulnerable to injuries from manual handling, while emergency department nurses were especially vulnerable to MSDs in their upper and lower limbs. The risk of MSDs in the upper and lower limbs was highest for emergency department nursing personnel, and the risk of manual material handling injuries was highest for critical care unit nursing staff. A six-times, 3.25-times, and 2.28-times rise in MSD conditions was observed in the hand and wrist, lower back or waist, and knee, respectively, when the link between MSD risk factors and NMQ scores was analyzed. The risk of MSD was observed to increase with medium and high workloads, which therefore impacted the nurses' capacity to do their jobs (Ou et al., 2021).

According to this survey, musculoskeletal illnesses related to the workplace are 47.7% common. The factors that were shown to be contributing were force exertion, repetitive jobs, physical handling of big items, stress, and inadequate training. Employees should receive more ergonomic awareness training. Owners should also look for ways to lower or get rid of the risk factors that these personnel have for musculoskeletal illnesses. Investigating automation of high-risk tasks is also necessary (Tamene et al., 2020).

The longer work hours, less job control, and physically demanding nature of the work may be the causes of the greater rate of musculoskeletal problems among MSW personnel. The reported high prevalence can be reduced by integrating a workplace health promotion paradigm, and another recommendation for a prospective cohort study may be made (Reddy et al., 2015).

This study emphasized the value of physical therapists in occupational health settings for ergonomics, worker health, MSD and WMSD prevention, get back to work initiatives, and manual intervention and prescription exercise. According to our review of the literature, ergonomic training, workplace safety and education, on-site physical therapy treatments like exercise and manual therapy, and return to work programs have a significant positive impact on both employees and employers by reducing injuries, raising productivity, lowering absenteeism, and facilitating injured workers' quicker return to work. Further study will be required to assist develop more efficient approaches, delivery methods, and interventions for worksite health promotion programs within sedentary occupations, given the rising prevalence of MSDs and WMSDs. Other tactics include focusing on certain populations identified through risk factor identification and implementing suitable education and exercise programs, as well as encouraging more businesses to look for ergonomics training and on-site physical therapy services from physical therapists. Making sure that payers, employers, and employees understand the critical role that physical therapists may play in occupational health is key. In addition, physical therapists must continue to provide skilled care to employees in unconventional ways and fight for their position in occupational health (Prall et al., 2019).

WMSS is substantially greater in DGWs than in SWDs. Among DGWs in particular, high DBP, female gender, working longer than eight hours a day, sleeping fewer than six hours a day, and inadequate exercise raise the risk of WMSDs. SWD and DGWs need break and leave intervals, personal protective equipment (PPE) and assistive gadgets, exercise, regular medical check-ups, and workplace ergonomics to lessen the negative impacts of WMSDs (Oluka et al., 2020).

Musculoskeletal diseases (MSDs) are the most common types of work-related illness associated with manual harvesting, a vocation that is physically demanding. In low- and low-middle-income countries, the risk factors for MSDs among hand harvesting farmers are not adequately studied. In order to identify ergonomic concerns, a study involving 140 farmers in Rajasthan, India was conducted using the Nordic Musculoskeletal Questionnaire and the Rapid Upper Limb Assessment (RULA) approach. To determine the correlation between the MSDs and different covariates, $\chi 2$

analysis was employed. Additionally, the methodology of logistic regression was used to determine the most important factor impacting MSDs in various body locations. More than 50% of workers experienced MSDs in the lumbar back, fingers, shoulders, and wrists/hands. Age, experience, gender, hand dominance, everyday work in farms, and reported work tiredness have all been linked to MSDs in one or more body locations. The results of logistic regression showed that, with the exception of the shoulder and neck, age was significantly linked with MSDs in every body location. Ninety-two percent of the farmers had an RULA grand score of five or higher, indicating the need for additional research and modifications (Jain et al., 2016).

There is insufficient data on the prevalence of musculoskeletal complaints and how they affect the quality of life of auto mechanics in Bangladesh. According to the study's findings, Bangladeshi autoworkers are at danger because of the need for a non-ergonomic workplace because of their posture and movement patterns. Therefore, this study just offers a picture of the current situation; further extensive research on the prevalence of musculoskeletal problems among auto technicians is required. The baseline data from this study can be used to modify the ergonomic approach for car mechanics. For car mechanics, a systematic ergonomics strategy would enable the management or prevention of musculoskeletal disorders associated with their employment (Akter et al., 2016).

The dispute over whether musculoskeletal diseases (MSDs) are related to labor is a reflection of gaps in the scientific literature as well as uncertainty over epidemiologic concepts. The physical ergonomic aspects of work, such as violent exertions, non-neutral body postures, vibration, fast work speed and repetitive motion, are often mentioned as risk factors for MSDs. Some people continue to contest these parameters' significance, particularly in light of non-occupational causes. This essay discusses the dispute using a significant report that the National Research Council (NRC) and Institute of Medicine (IOM) just completed at US Congress's request (2001). Although there is a lot of epidemiologic information now available, further longitudinal data will be helpful in order to assess the gaps in our understanding regarding the prognosis, natural history, latency of effect, and possibility of selection bias in the form of the healthy worker effect.

Subjective metrics better represent patient impact, even though objective measures might be particularly helpful in establishing a more firm diagnosis. There are still no "gold standard" examination methods available for many of the symptoms that are frequently reported in workplace research. Lastly, the evaluation of exposure has far too frequently relied on rudimentary markers, including work title. While direct measurement, investigator observation, and worker self-report all contribute to our understanding, the inability to compare study results across different settings is hampered by the absence of standard exposure measurements (Punnet et al., 2004).

This study concludes that musculoskeletal diseases (MSDs) are highly prevalent among workers in the central market area. Awkward postures combined with heavy loads are known to contribute to the development of MSDs (Sarkar et al., 2016).

Following observation and analysis of the data, it can be said that a high incidence of MSDs affects railway sahayaks. This can be due to the habit of carrying large weights and assuming uncomfortable positions. The neck, lower back, shoulder, knee, and ankles/feet are the main body parts affected. Muscle activity increased in proportion to an increase in load, as indicated by the EMG (%MVC) data. As such, after performing such chores, it may lead to sahayak tiredness (Vollestad, 1997; Nur, 2015).

The working conditions of sahayaks may have an impact on their regular physical activity, which could eventually lead to the development of major MSDs. Additionally, the REBA scores showed that the adopted postures were at a high risk level and that quick ergonomic interventions were necessary to improve postures connected to the workplace. A few design innovations, such as an automatic hook system to move luggage from one station to another and creative body armor to disperse burdens on various body parts rather than just the head and shoulder, should be highlighted in addition to drawing attention to the predicament of the sahayaks. To determine a more widespread pattern of MSDs for sahayaks employed in various parts of India, more research should be conducted on a broader population. To identify a more widespread trend of MSDs and enable the adoption of the required preventive measures, more research should be conducted on a broader population of sahayaks employed in various parts of India. To

obtain more broadly applicable findings, a more thorough investigation might also be carried out across other industries using comparable or dissimilar lifting techniques. Other neck-shoulder muscles outside the upper trapezius muscle should be evaluated using a multi-channel advanced EMG instrument (Khan et al., 2018).

The greatest occupational health issue that workers in the furniture manufacturing industry still face is WMSDs. Therefore, in order to lessen the health burden caused by WMSDs, several practical and efficient preventive measures for workers in the furniture manufacturing industry are needed (Yang et al., 2022).

Lower extremity MSDs are very common among Chinese manufacturing workers. The knees and ankles/feet were the most often affected body parts. Lower extremity MSDs have been linked to a number of variables, including age, BMI, work experience, workplace culture, exposure to physical ergonomics, etc (Jin et al., 2022).

The purpose of our study is to determine the prevalence of musculoskeletal disorders among railroad manual laborers. Welders, assistants, painters, blacksmiths, coachbuilders, and manual machine handlers who worked for a year in the railroad industry were among the manual laborers in our study. This observational study included 300 male Pakistan Railway Lahore manual laborers as its sample. The Nordic Musculoskeletal Questionnaire was used to estimate the prevalence of musculoskeletal disorders in the previous 12 months. In the preceding 12 months, 96% of manual laborers reported having musculoskeletal ailments in at least one body area. Lower back (71.3%), shoulders (50.7%), knees (48%) and upper back (41.3%) were the most common regions. The prevalence rates for elbows (16%), hips (11.7%), ankles (11%), neck (7.7%), wrists, and hands (3.3%), and other locations were as follows. The Lahore railway's manual laborers have a high prevalence of musculoskeletal problems, which might lead to further morbidities and functional restrictions, according to the study's findings. The study found a substantial correlation between several demographic factors, including BMI, working posture, work experience, amount of exertion, and certain systemic conditions, and the high prevalence of musculoskeletal disorders measured. The lower back was the most impacted area, and it was significantly correlated with BMI, smoking, education,

experience, posture, training, length of training, and exertion. According to the recommendations of occupational health and safety, this predominance of musculoskeletal problems needs to be addressed in order to promote the physical and mental health of manual laborers (Irshad et al., 2021).

CHAPTER – III METHODOLOGY

3.1 Study design

The aim of this study was an observational study with a cross sectional design.

3.2 Study area

Saidpur Railway Workshop, Saidpur and Bangladesh Railway Central Locomotive Workshop Parbatipur, Dinajpur.

3.3 Study period

The duration of the study was 12 months from 1st July, 2022 to 30th June, 2023.

3.4 Study population

All of manual workers in Saidpur Railway Workshop and Bangladesh Railway Central Locomotive Workshop Parbatipur, Dinajpur who fulfill the inclusion and exclusion criteria of this study.

3.5 Sample size

Sample size, $n = \frac{z^2 pq}{d^2}$

or, $n = \frac{(1.96)2 \times 0.65 \times 0.35}{(0.05)2}$

or, n = 349.5856

Here,

z = The standard normal deviate 1.96

P = Proportion of target population is 65 %. (Khan et al. 2018)

q = 1-p

d = marginal error 0.05

Accordingly, the researcher's starting target for his study was 349 samples, using the formula above.

3.6 Sampling technique

Convenience sampling technique was applied to collect data.

3.7 Eligibility criteria

3.7.1 Inclusion criteria

1. Male workers.
2. Age 18 yrs-59 yrs (Irshad et al., 2021).
3. Duration of manual work for minimum 30 hr/week.
4. Minimum work experience of 1 year before participation in the study (Irshad et al., 2021).

3.7.2 Exclusion criteria

Any recent accident or trauma (last 12 month). Any recent surgeries. Computer operators and desk-based jobs.

3.8 Method of data collection

A research questionnaire was administered in one-to-one interviews where the first part of the questionnaire contained demographic information, second part was job-related risk factors, third part was systemic disorders related information and forth part was a modified Nordic Musculoskeletal Questionnaire.

3.9 Instrument and tools of data collection Management of data

Data Collection instrument was Questionnaire and tools was weight machine, height measuring tape, etc.

3.9.1 Data editing

SPSS-25 version and Microsoft office.

3.9.2 Data entry

Statistical packages for social sciences (SPSS-25 version).

3.9.3 Data analysis

Data was analyzed in Microsoft Word 2010 using Statistical Package for Social Sciences (SPSS) 25 version software program and find out the association uses Pearson chi square test.

3.10 Ethical consideration

Before data collection, permission for the ethical review board of Saic College of Medical Science and Technology (SCMST). Prior to data collection, the objective of the study explained in understandable language to the study participant and their written informed consent were taken. The prospective participants gave free opportunity to receive summary information of the study in writing before giving consent and take part in the interview of the study. The participants right to refuse and withdraw from the study was accepted.

CHAPTER – IV RESULTS

The aim of the study was determine the prevalence of musculoskeletal disorders (MSDs) and associated factors among manual workers in railway workshops in Rangpur division, Bangladesh. The data was collected by the researcher himself. Structured question was used with both open ended and close ended questions in the questionnaire. The data was analyzed with Microsoft office Excel 2007 with SPSS 25 version software program. In this study, I use bar, column, figure, pie chat, line, area diagram to show the result of the study. Because, it is easier to make sense of a set of data.

4.1: Socio-demographic information

4.1.1: Age groups

Table no. 1. Frequency distribution of the respondents by age

Age group in years	Frequency	
	N	%
20 – 30	99	28.4
31 – 40	141	40.4
41 – 50	34	9.7
≥50	45	21.5
Total	349	100.0

Mean = 38.33, SD ± 11.344

This study's mean and standard deviation of age of the participants where are Mean ± SD = 38.33±11.344. Regarding frequency distribution of the respondents by age, it was found that out of 349 railway workers, 141 (40.4%) respondents belonged to the age group of 31 – 40 years. It was also revealed that 99 (28.4%) respondents were in the age group of 20 – 30 years. The study showed that 45 (21.5%) workers were 50 years and above (Table no.1).

4.1.2: Level of education

The study revealed that frequency distribution of the respondents by level of education, out of 349 railway workers, 53% (N=186) respondents was secondary. It is also showed that 26% (N=92) respondents was higher secondary. Regarding about this study 18% (N=62) respondents was bachelor (Figure no. 1).

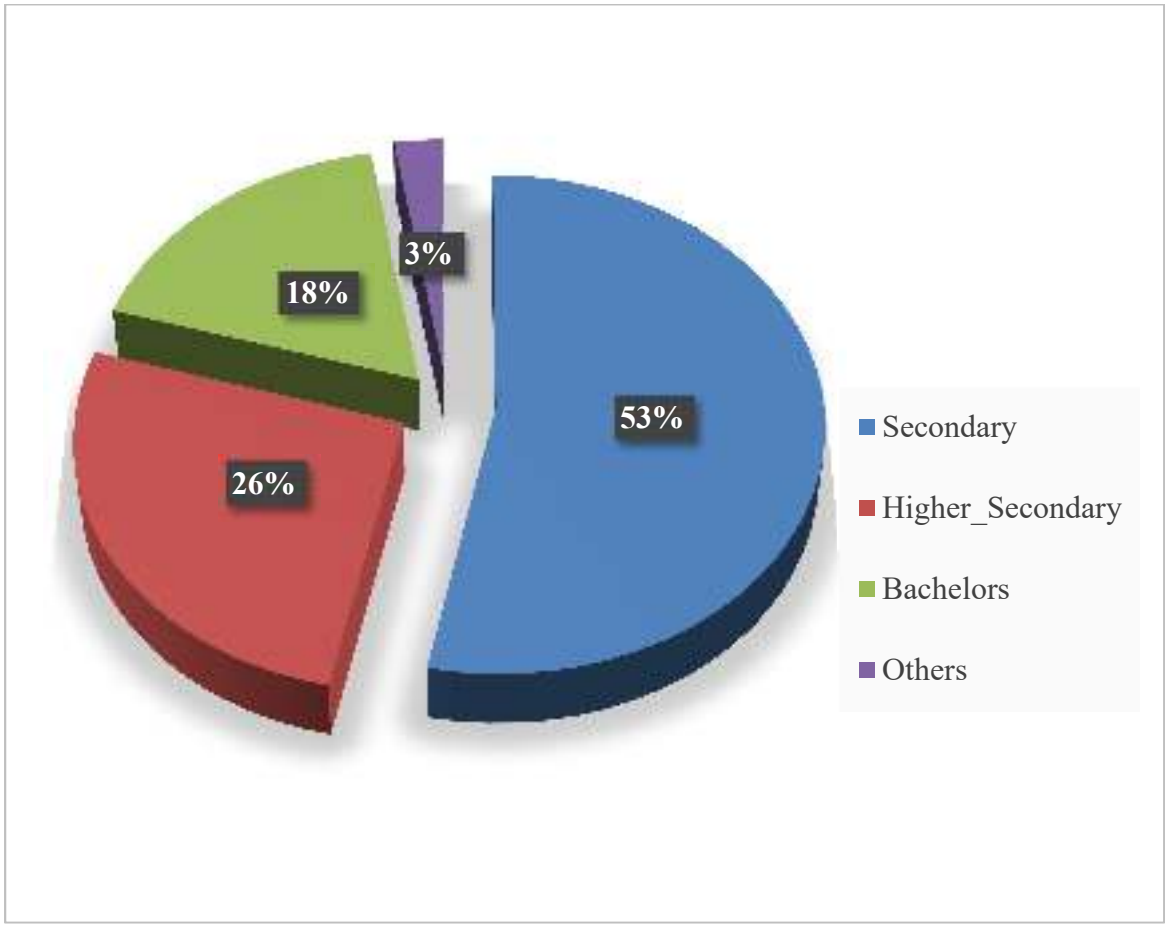


Figure no. 1. Frequency distribution of the respondents by level of education

4.1.3: Types of family

Regarding frequency distribution of the respondents by types of family, the study was showed that out of 349 railway workers, 180 (51.6%) respondents lived in extended family and 169 (48.4%) respondents lived in nuclear family (Figure no. 2).

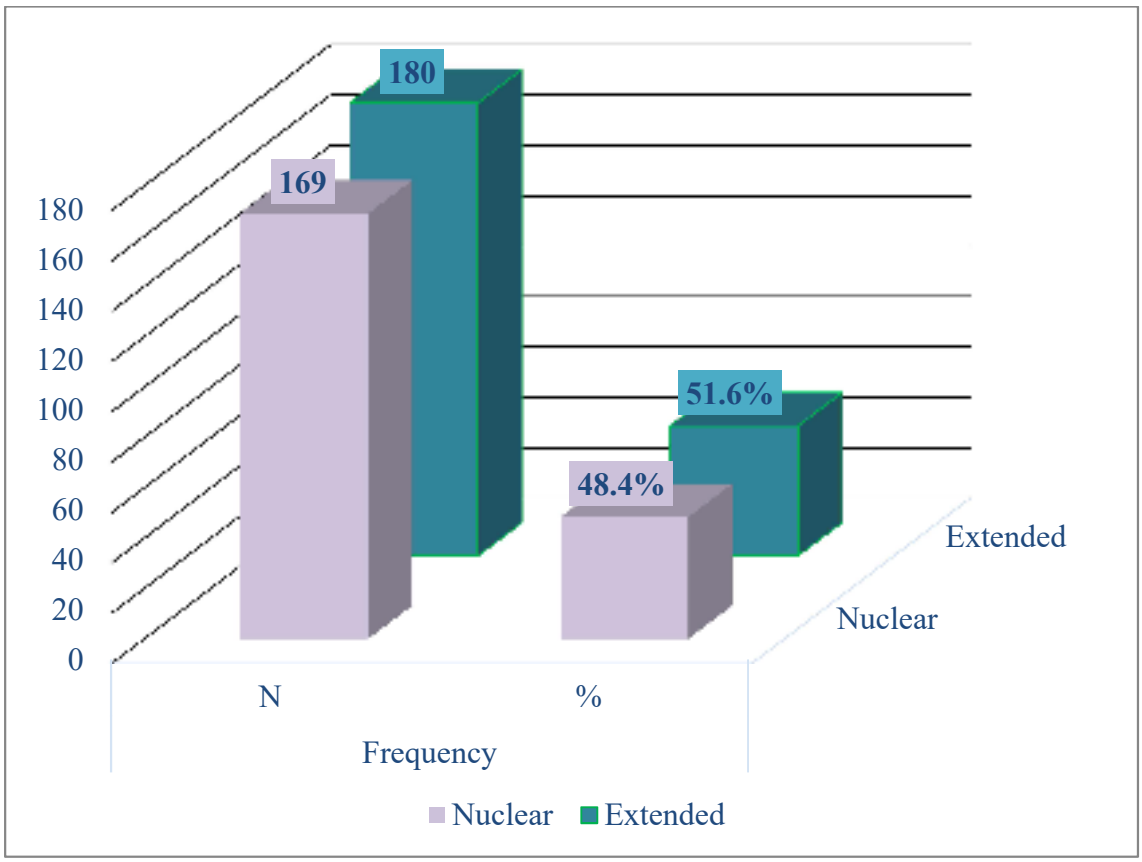


Figure no. 2. Frequency distribution of the respondents by types of family

4.1.4: Marital status

Table no. 2. Frequency distribution of the respondents by marital status

Marital status	Frequency	
	N	%
Married	298	85.4
Unmarried	49	14.0
Others	2	0.6
Total	349	100.0

The study showed that frequency distribution of the respondents by marital status, out of 349 railway workers, 298 (85.4%) respondents were married. It is also showed that 49 (14%) respondents were unmarried (Table no. 2).

4.1.5: Monthly income

Table no. 3. Frequency distribution of the respondents by monthly income

Monthly income	Frequency	
	N	%
<10000 Taka	44	12.6
10000 – 20000 Taka	236	67.6
20001 – 30000 Taka	62	17.8
≥30001 Taka	7	2.0
Total	349	100.0

Mean = 15439.47, SD ± 5520.258

Regarding frequency distribution of the respondents by monthly income, it was found that out of 349 railway workers, 236 (67.6%) workers belonged to the group of 10000 – 20000 Taka. It was also showed that 62 (17.8%) workers were in the group of 20001 – 30000 Taka. The study revealed that 44 (12.6%) respondents were in the group of below 10000 Taka. This study‘s mean and standard deviation of monthly income of the participants where are Mean ± SD = 15439.47±5520.258 (Table no. 3).

4.1.6: Religion

Regarding about frequency distribution of the respondents by religion, it was showed that out of 349 railway workers, 322 (92.3%) respondents were Muslim and 27 (7.7%) respondents were Hindu (Figure no. 3).

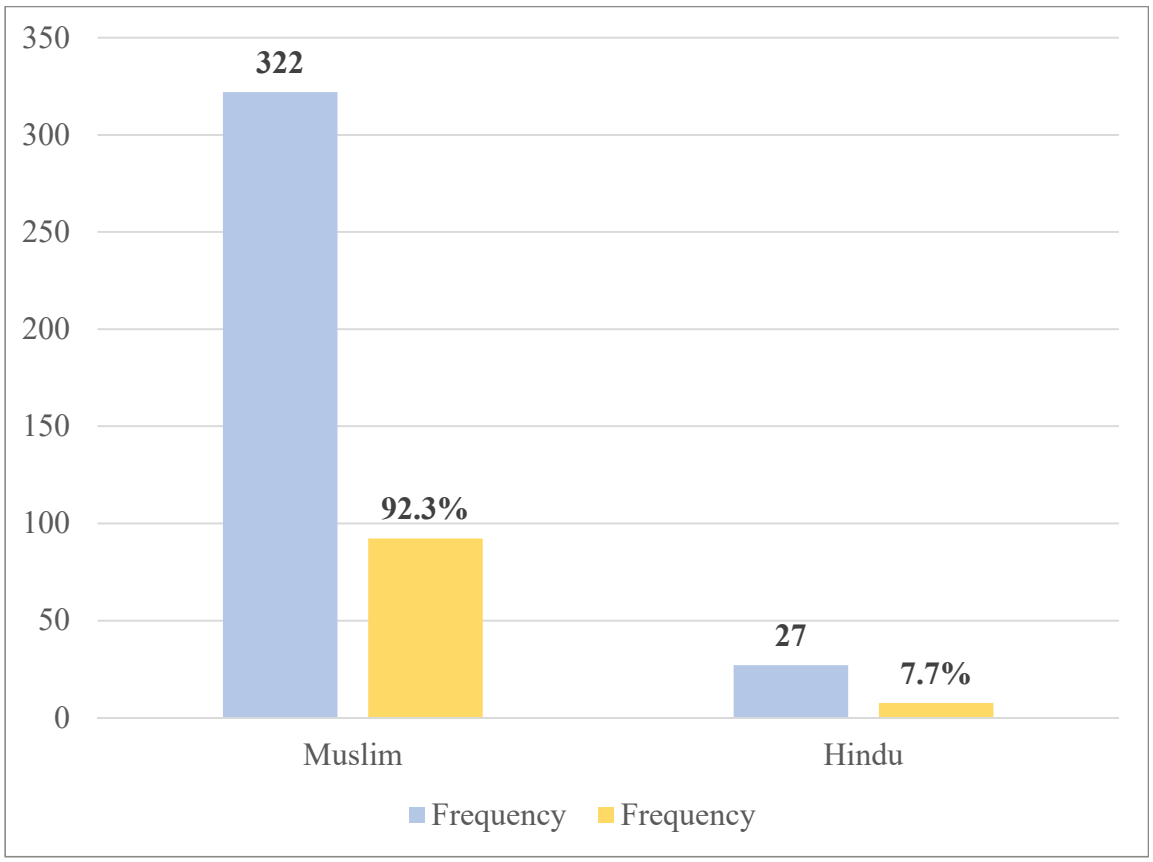


Figure no. 3. Frequency distribution of the respondents by religion

4.1.7: BMI (Body Mass Index)

Table no. 4. Frequency distribution of the respondents by BMI

BMI group in Kg/M^2	Frequency	
	N	%
<18.5 (Underweight)	10	2.9
18.5 – 24.9 (Normal weight)	180	51.6
25 – 29.9 (Overweight)	135	38.7
>30 (Obese)	24	6.9
Total	349	100.0

Mean = 24.592, SD ± 3.4598

The study revealed that frequency distribution of the respondents by BMI, it was found that out of 349 railway workers, 180 (51.6%) respondents belonged to the BMI group of 18.5 – 24.9 (Normal weight). It was also found that 135 (38.7%) respondents were in the BMI group of 25 - 29.9 (Overweight). The study showed that 24 (6.9%) workers were in the BMI group of above 30 (Obese). This study‘s mean and standard deviation of BMI of the participants where are Mean ± SD = 24.592±3.4598 (Table no. 4).

4.2: Work related information

4.2.1: Working experience

Table no 5. Frequency distribution of the respondents by working experience

Working experience group in years	Frequency	
	N	%
1 – 10 years	203	58.2
11 – 20 years	67	19.2
21 – 30 years	26	7.4
Greater than 30	53	15.2
Total	349	100.0

Mean = 13.00, SD ± 12.715

Regarding frequency distribution of the respondents by working experience, it was found that out of 349 railway workers, 203 (58.2%) respondents belonged to the working experience group of 1 – 10 years. It was also found that 67 (19.2%) respondents were in the working experience group of 11 – 20 years. The study showed that 53 (15.2%) workers were in the working experience group of Greater than 30 years. Regarding about this study found that 26 (7.4%) respondents were in the working experience group of 21 – 30 years. This study‘s mean and standard deviation of BMI of the participants where are Mean ± SD = 13.00±12.715 (Table no. 5).

4.2.2: Working hours

Regarding about frequency distribution of the respondents by working hours, it was showed that out of 349 railway workers, 209 (59.9%) respondents working hours were 9 hours and 140 (40.1%) respondents working hours were 8 hours (Figure no. 4).

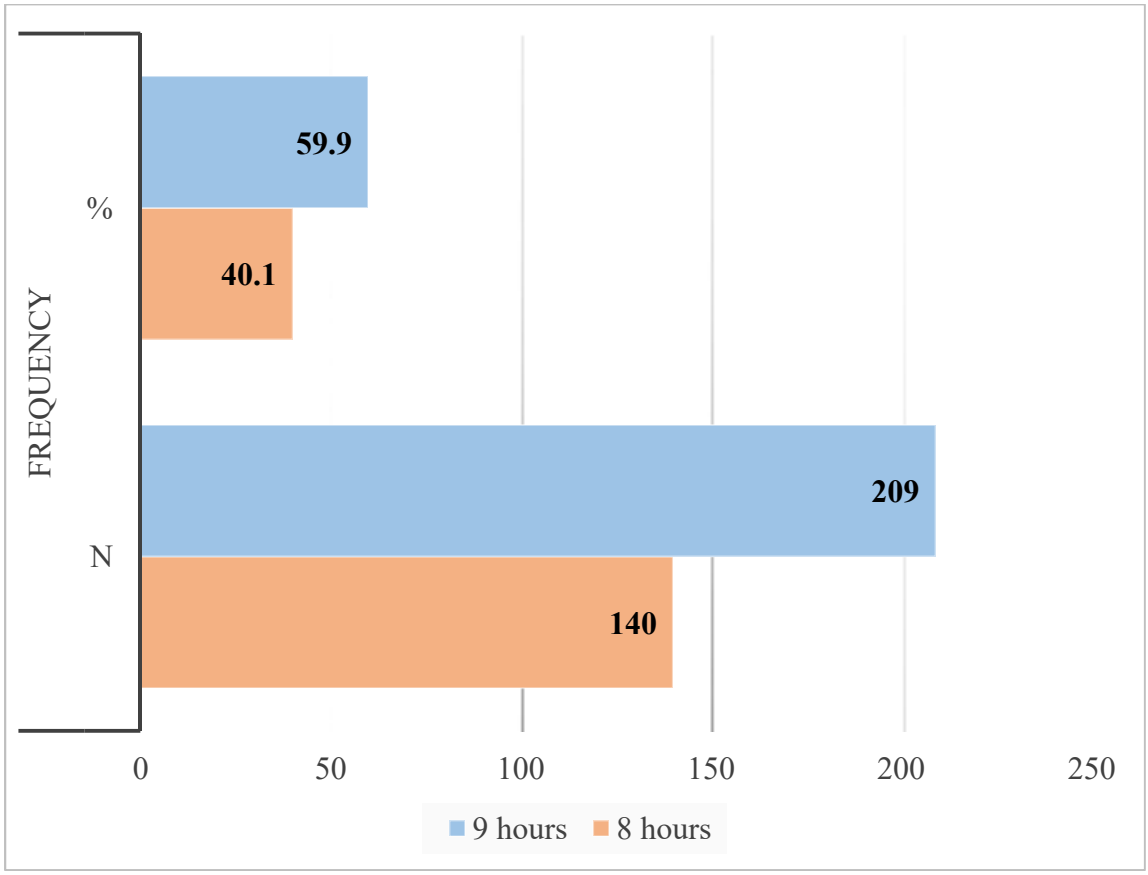


Figure no. 4. Frequency distribution of the respondents by working hours

4.2.3: Workplace activities

Regarding about this study revealed that frequency distribution of the respondents by workplace activities, out of 349 railway workers, 49% (N=171) respondents workplace activities were all types of work. The study also showed that 36% (N=125) respondents workplace activities were heavy lifting. It was found that 13% (N=46) workers workplace activities were manual handling (Figure no.5).

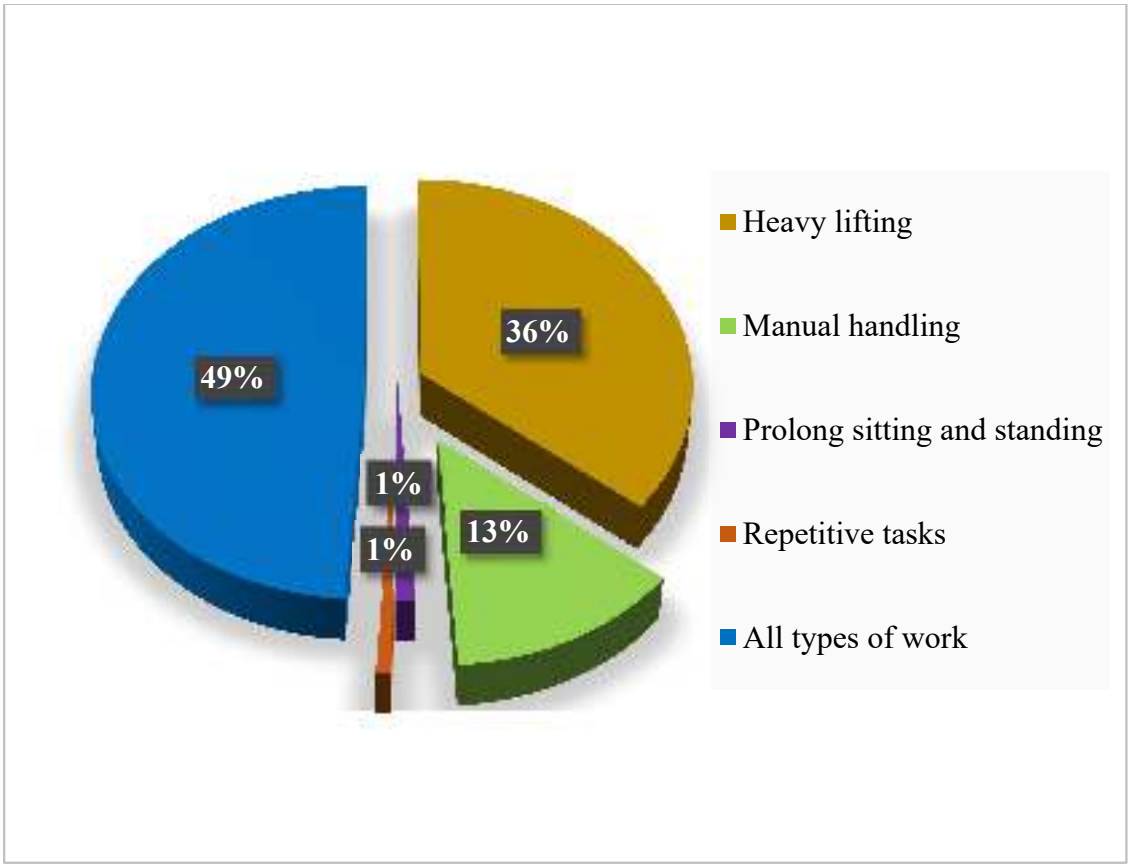


Figure no. 5. Frequency distribution of the respondents by workplace activities

4.2.4: Working posture

Table no. 6. Frequency distribution of the respondents by working posture

Working posture	Frequency	
	N	%
Sitting	12	3.4
Standing	52	14.9
Both (sitting + standing)	258	73.9
Bending	2	0.6
Others	25	7.2
Total	349	100.0

Regarding frequency distribution of the respondents by working posture, the study was revealed that out of 349 railway workers, 258 (73.9%) respondents working posture were both (sitting and standing) and 52 (14.9%) respondents working posture were standing. It was also found that 25 (7.2%) railway workers were other types of working posture. Regarding about this study 12 (3.4%) workers working posture were sitting (Table no.6).

4.2.5: Exertion

The study revealed that frequency distribution of the respondents by exertion, out of 349 railway workers, 56% (N=194) railway workers were high exertion during office time. It was also found that 41% (N=145) railway workers were moderate and 3% (N=10) railway workers were mild exertion during office time (Figure no. 6).

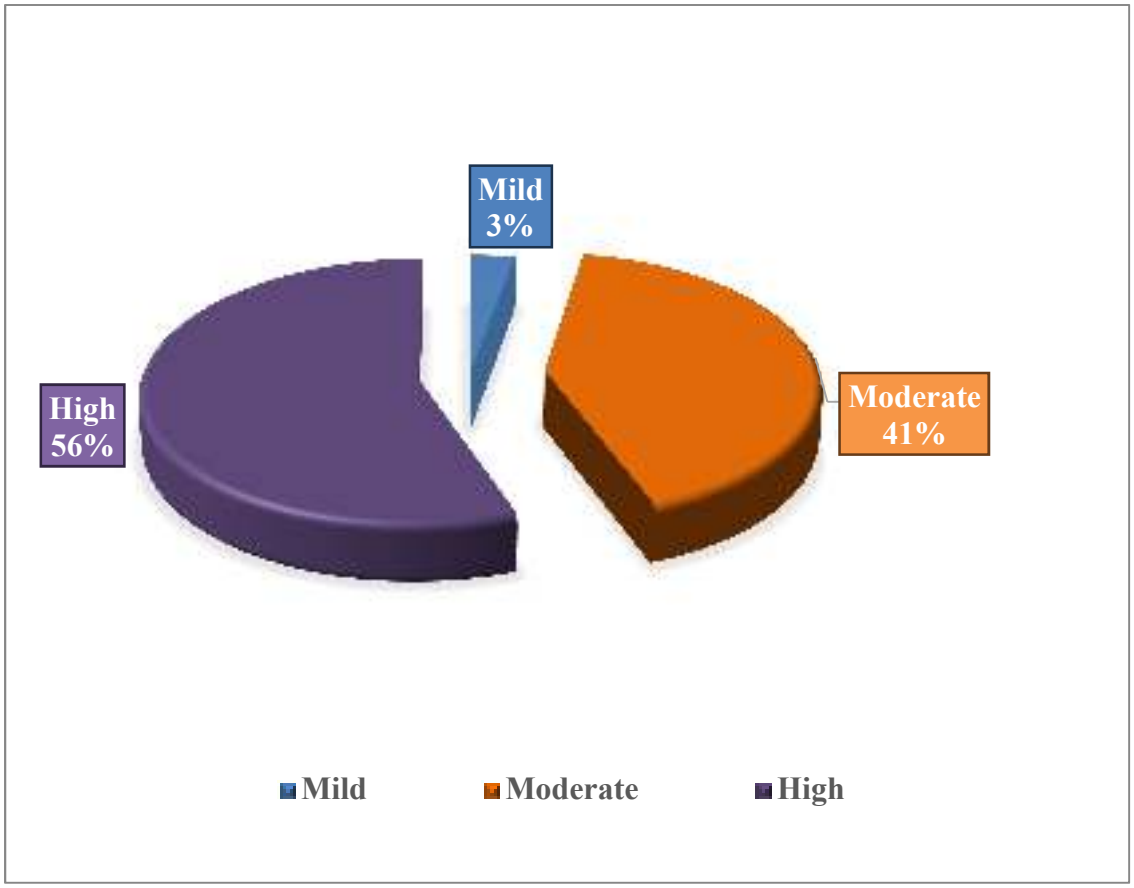


Figure no. 6. Frequency distribution of the respondents by exertion

4.2.6: Received training

Table no. 7. Frequency distribution of the respondents by on job training

Received training	Frequency	
	N	%
Yes	240	68.8
No	109	31.2
Total	349	100.0

The study was found that frequency distribution of the respondents by on job training, out of 349 railway workers, 240 (68.8%) respondents were received training and 109 (31.2%) respondents were not received training (Table no.7).

4.2.7: Reduction of MSD after training

The study was showed that frequency distribution of the respondents by reduction of Musculoskeletal Disorder (MSD) after training, out of 240 received training railway workers, 238 (99.1667%) respondents were reduction of Musculoskeletal Disorder (MSD) after training and 2 (0.8333%) respondents were not reduction of Musculoskeletal Disorder (MSD) after training (Figure no.7).

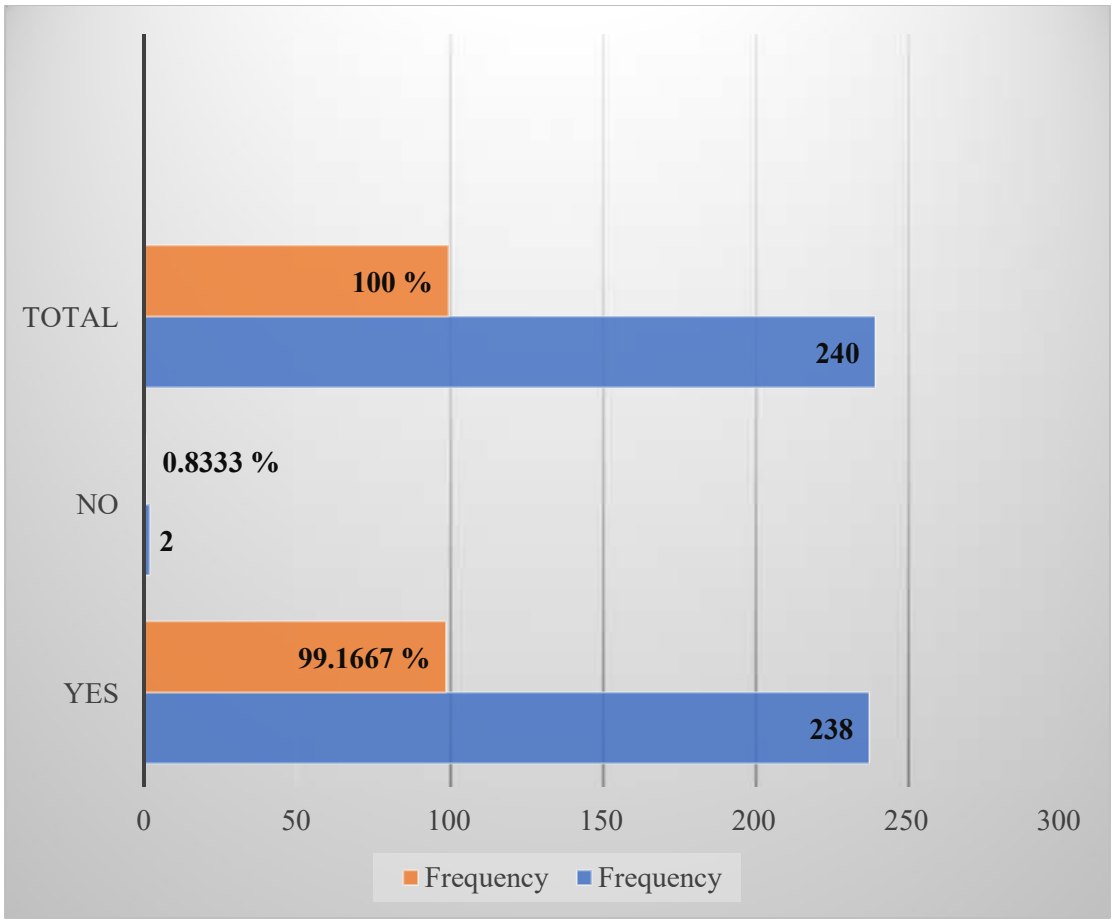


Figure no. 7. Frequency distribution of the respondents by reduction of musculoskeletal disorder (MSD) after training

4.3: System disorders related information

4.3.1: Cardiovascular problem

Table no. 8. Frequency distribution of the respondents by cardiovascular system (CVS) problems

Cardiovascular problem	Frequency	
	N	%
Yes	21	6.0
No	328	94.0
Total	349	100.0

The study was showed that frequency distribution of the respondents by cardiovascular system (CVS) problems, out of 349 railway workers, 6% (N=21) railway workers were suffering from CVS problem (Table no. 8).

4.3.2: Pulmonary problems

Table no. 9. Frequency distribution of the respondents by pulmonary problems

Pulmonary problems	Frequency	
	N	%
Yes	37	10.6
No	312	89.4
Total	349	100.0

Regarding about this study revealed that frequency distribution of the respondents by pulmonary problems, out of 349 railway workers, 37 (10.6%) railway workers were suffering from Pulmonary problems (Table no. 9).

4.3.3: ENT problems

Table no. 10. Frequency distribution of the respondents by ENT problems

ENT problems	Frequency	
	N	%
Yes	143	41.0
No	206	59.0
Total	349	100.0

The study revealed that Frequency distribution of the respondents by ENT problems, out of 349 railway workers, 41% (N=143) railway workers suffering from ENT problems (Table no. 10).

4.3.4: Metabolic syndrome

Table no. 11. Frequency distribution of the respondents by metabolic syndrome

Metabolic syndrome	Frequency	
	N	%
Yes	80	22.9
No	269	77.1
Total	349	100.0

The study was showed that frequency distribution of the respondents by metabolic syndrome, out of 349 railway workers, 80 (22.9%) railway workers suffering from metabolic syndrome (Table no. 11).

4.4: Musculoskeletal discomfort related information

(Based on Nordic Questionnaire (Kourinka et al.1987))

4.4.1: Trouble (ache, pain, discomfort, numbness) in various body parts at any time during the last 12 months

Table no. 12. Frequency distribution of the respondents by Nordic Musculoskeletal Questionnaire Statistics of trouble in last 12 months

Body Regions	Frequency	Percentage (%)
Neck	66	18.9%
Shoulders		
Right shoulder	22	6.3%
Left shoulder	15	4.3%
Both shoulder	18	5.2%
Elbows		
Right elbow	11	3.2%
Left elbow	6	1.7%
Both elbow	16	4.6%
Wrists/Hands		
Right wrist/hand	14	4.0%
Left wrist/hand	7	2.0%
Both wrists/hands	32	9.2%
Upper back	37	10.6%
Lower back	199	57.0%
Hip/Thigh	25	7.2%
Knee	118	33.8%
Ankle/Foot	56	16.0%

The 4.4.1 frequency distribution table represented that the prevalence of MSDs in different body parts of the railway workers in last 12 months. The primary affected body parts were lower back (57.0%), knee (33.8%), neck (18.9%), ankle/feet (16.0%), upper back (10.6%), both wrists/hands (9.2%), hips/thighs (7.2%) and right shoulder (6.3%) (Table no. 12).

4.4.2: Because of the trouble in various body parts at any time during the last 12 months been prevented from doing your normal work (at home or away from home)

Table no. 13. Frequency distribution of the respondents by Nordic Musculoskeletal Questionnaire Statistics of prevented normal work

Body Regions	Frequency	Percentage (%)
Neck	64	18.3%
Shoulder	55	15.8%
Elbow	33	9.5%
Wrist/Hand	54	15.5%
Upper back	37	10.6%
Lower back	196	56.2%
Hip/Thigh	26	7.4%
Knee	118	33.8%
Ankle/Foot	56	16.0%

The 4.4.2 frequency distribution table showed that the prevalence of MSDs in different body parts of the railway workers in last 12 months have been prevented from doing your normal work. The primary affected body parts were lower back (56.2%), knee (33.8%), neck (18.3%), ankle/feet (16.0%), shoulders (15.8%), wrists/hands (15.5%) upper back (10.6%), elbow (9.5%) and hips/thighs (7.4%) (Table no. 13).

4.4.3: Trouble in various body parts at any time during the last 7 days

Table no. 14. Frequency distribution of the respondents by Nordic Musculoskeletal Questionnaire Statistics of trouble in last 7 days

Body Regions	Frequency	Percentage (%)
Neck	40	11.5%
Shoulder	38	10.9 %
Elbow	17	4.9 %
Wrist/Hand	33	9.5 %
Upper back	29	8.3%
Lower back	140	40.1%
Hip/Thigh	18	5.2%
Knee	80	22.9 %
Ankle/Foot	46	13.2%

The 4.4.3 frequency distribution table represented that the prevalence of MSDs in different body parts of the railway workers in last 7 days. The primary affected body parts were lower back (40.1%), knee (22.9%), ankle/feet (13.2%), neck (11.5%), shoulders (10.9%), upper back (8.3%), wrists/hands (9.5%), hips/thighs (5.2%) and elbows (4.9%) (Table no. 14).

4.5: Association between Musculoskeletal Disorders and Socio-demographic factors.

4.5.1 Association between Age and MSDs in Neck of the railway workers in last 12 months

Table no. 15. Association between age of the participants and MSDs in Neck of the railway workers in last 12 months

Age of the participants (Years)	Trouble (ache, pain, discomfort, numbness) in Neck of the participants during the last 12 months		*P* Value	Chi Value (x^2)
	Yes	No		
20-30	22	77	0.250	4.113
31-40	22	119		
41-50	4	30		
Greater than 50	18	57		

Here, chi-value 4.113 and P = 0.250 < 0.05 represents as non-significant and indicate that those non-significant relation between age of the participants and MSDs in Neck of the railway workers in last 12 months (Table no. 15).

4.5.2 Association between Age and MSDs in Elbow of the railway workers in last 12 months

Table no. 16. Association between age of the participants and MSDs in Elbow of the railway workers in last 12 months

Age of the participants (Years)	Trouble (ache, pain, discomfort, numbness) in Elbow of the participants during the last 12 months				*P* Value	Chi Value (x^2)
	Yes right elbow	Yes left elbow	Yes both elbow	No		
20-30	1	0	6	92	0.05	16.588
31-40	3	2	3	133		
41-50	2	2	1	29		
Greater than 50	5	6	6	62		

Here, chi-value 16.588 and P = 0.05 < 0.05 represents as significant and indicate that those significant relation between age of the participants and MSDs in Elbow of the railway workers in last 12 months (Table no. 16).

4.5.3 Association between Age and MSDs in Wrists/Hands of the railway workers in last 12 months

Table no. 17. Association between age of the participants and MSDs in Wrists/Hands of the railway workers in last 12 months

Age of the participants (Years)	Trouble (ache, pain, discomfort, numbness) in Wrists/Hands of the participants during the last 12 months				*P* Value	Chi Value (x^2)
	Yes right Wrists/ Hands	Yes left Wrists/Hands	Yes both Wrists/Hands	No		
20-30	5	2	10	82	0.044	17.315
31-40	4	1	7	129		
41-50	2	3	4	25		
Greater than 50	3	1	11	60		

Here, chi-value 17.315 and P = 0.044 < 0.05 represents as significant and indicate that those significant relation between age of the participants and MSDs in Wrists/Hands of the railway workers in last 12 months (Table no. 17).

4.5.4 Association between Age and MSDs in Lower back of the railway workers in last 12 months

Table no. 18. Association between age of the participants and MSDs in Lower back of the railway workers in last 12 months

Age of the participants (Years)	Trouble (ache, pain, discomfort, numbness) in Lower Back of the participants during the last 12 months		*P* Value	Chi Value (x^2)
	Yes	No		
20-30	55	44	0.485	2.448
31-40	87	54		
41-50	17	17		
Greater than 50	40	35		

Here, chi-value 2.448 and P = 0.485 < 0.05 represents as non-significant and indicate that those non-significant relation between age of the participants and MSDs in Lower back of the railway workers in last 12 months (Table no. 18).

4.6 Association between Musculoskeletal Disorders and Work related information

4.6.1 Association between workplace activities and MSDs in Hip/Thighs of the railway workers in last 12 months

Table no. 19. Association between workplace activities of the participants and MSDs in Hip/Thighs of the railway workers in last 12 months

Workplace activities of the participants	Trouble (ache, pain, discomfort, numbness) in Hip/Thighs of the participants during the last 12 months		*P* Value	Chi Value (x^2)
	Yes	No		
Heavy lifting	5	120	0.074	8.518
Manual handling	7	39		
Prolong sitting and standing	1	3		
Repetitive Task	0	3		
All types of work	12	159		

Here, chi-value 8.518 and P = 0.074 < 0.05 represents as non-significant and indicate that those non-significant relation between workplace activities of the participants and MSDs in Hip/Thighs of the railway workers in last 12 months (Table no. 19).

4.6.2 Association between workplace activities and MSDs in Ankles/Feet of the railway workers in last 12 months

Table no. 20. Association between workplace activities of the participants and MSDs in Ankles/Feet of the railway workers in last 12 months

Workplace activities of the participants	Trouble (ache, pain, discomfort, numbness) in Ankles/Feet of the participants during the last 12 months		*P* Value	Chi Value (x^2)
	Yes	No		
Heavy lifting	13	112	0.015	12.359
Manual handling	12	34		
Prolong sitting and standing	1	3		
Repetitive Task	2	1		
All types of work	28	143		

Here, chi-value 12.359 and P = 0.015 < 0.05 represents as significant and indicate that those significant relation between workplace activities of the participants and MSDs in Ankles/Feet of the railway workers in last 12 months (Table no. 20).

4.6.3 Association between exertion during office time and MSDs in Lower back of the railway workers in last 12 months

Table no. 21. Association between exertion during office time of the participants and MSDs in Lower back of the railway workers in last 12 months

Exertion during office time of the participants	Trouble (ache, pain, discomfort, numbness) in Lower Back of the participants during the last 12 months		*P* Value	Chi Value (x^2)
	Yes	No		
Mild	5	5	0.026	7.264
Moderate	71	74		
High	123	71		

Here, chi-value 7.264 and P = 0.026 < 0.05 represents as significant and indicate that those significant relation between exertion during office time of the participants and MSDs in Lower back of the railway workers in last 12 months (Table no. 21).

4.6.4 Association between job experience and MSDs in One or Both Knees of the railway workers in last 12 months

Table no. 22. Association between job experience of the participants and MSDs in One or Both Knees of the railway workers in last 12 months

Job experience of the participants	Trouble (ache, pain, discomfort, numbness) in One or Both Knee of the participants during the last 12 months		*P* Value	Chi Value (x^2)
	Yes	No		
1-10 Years	52	151	0.000	21.449
11-20 Years	23	44		
21-30 Years	13	13		
Greater than 30	30	23		

Here, chi-value 21.449 and P = 0.000 < 0.05 represents as significant and indicate that those significant relation between job experience of the participants and MSDs in One or Both Knees of the railway workers in last 12 months (Table no. 22).

4.6.5 Association between job experience and MSDs in Ankles/Feet of the railway workers in last 12 months

Table no. 23. Association between job experience of the participants and MSDs in Ankles/Feet of the railway workers in last 12 months

Job experience of the participants	Trouble (ache, pain, discomfort, numbness) in Ankles/Feet of the participants during the last 12 months		*P* Value	Chi Value (x^2)
	Yes	No		
1-10 Years	24	179	0.05	7.527
11-20 Years	15	52		
21-30 Years	4	22		
Greater than 30	13	40		

Here, chi-value 7.527 and P = 0.05 < 0.05 represents as significant and indicate that those significant relation between job experience of the participants and MSDs in Ankles/Feet of the railway workers in last 12 months (Table no. 23).

CHAPTER – V DISCUSSION

The aim of the study was to determine the prevalence of musculoskeletal disorders (MSDs) and associated factors among manual workers in railway workshops in Rangpur division, Bangladesh.

According to Sarkar et al. (2016), 210 male manual material handling (MMH) workers were chosen at random for the study. The body part with the worst damage was discovered to be the lower back (68%), followed by the knee (63%), neck (56%) and shoulder (41%).

According to Irshad et al. (2021), the sample size for his observational study consisted of 300 male manual laborers employed by the Pakistan Railway in Lahore. The Nordic Musculoskeletal Questionnaire was used to ascertain the prevalence of musculoskeletal disorders over the previous 12 months. In the preceding 12 months, 96% of manual laborers reported having musculoskeletal ailments in at least one body area. Lower back (71.3%), shoulders (50.7%), knees (48%) and upper back (41.3%) were the most common regions. The prevalence rates for elbows (16%), hips (11.7%), ankles (11%), neck (7.7%), wrists, and hands (3.3%), and other locations were as follows.

According to Khan et al. (2018), during the previous year of predominance, the neck (47%), shoulder (51%), lower back (43%), and knee (47%), were the most affected body regions among railway sahayaks. Age group and MSDs were shown to be significantly correlated in several body locations ($p = 0.012$ for the neck, $p = 0.017$ for the shoulder, etc.).

Sarkar et al. (2016) contended that 100 MMH employees were chosen at random for the study. Within the last year, 95% of workers reported experiencing a medical surgical defect (MSD) in at least one body component.

According to Tamene et al. (2020), the investigation was A cross-sectional study including 344 auto repair personnel in the city of Hawassa was carried out within an institution. Nine body regions were evaluated for musculoskeletal problems connected to

the workplace using the Nordic Musculoskeletal Questionnaire-Extended (NMQ-E). The data were characterized and characteristics linked to musculoskeletal problems connected to the workplace were identified using multivariable analysis and descriptive statistics. Within this working group, the prevalence of musculoskeletal problems connected to the workplace over a 12-month period was 47.7%.

Reddy et al. (2015) reported that 220 MSW workers were recruited from the Chennai Municipal Corporation in India for this cross-sectional study, which used probability proportionate to size sampling. In contrast to 91.8% of individuals who reported having pain in the previous seven days, 70% of participants said they had experienced musculoskeletal discomfort in one or more of the nine indicated body locations during the previous 12 months. There was a higher than average prevalence of symptoms in the lower back, shoulders, and knees 84.5%, 74.5%, and 50.9%, respectively.

According to Akter et al. (2016), the research was cross-sectional. It was carried out with one hundred automobile workers who were easily chosen from two distinct automobile workshops in Bangladesh's Dhaka Division (Savar and Gabtoli). According to reports, 77% of people had musculoskeletal complaints in the 12 months before to data collection. The hips (53%) and lower back (67%) were the most affected body parts.

In this study was an observational study with a cross sectional design. It was carried out with 349 male manual workers in railway workshops in Rangpur division, Bangladesh.

In this study showed that in the previous 12 months, 57% of workers reported having an MSD in at least one body area. According to this study, during the previous year of predominance, lower back (57%), knee (33.8%), the ankles/feet (16.0%), and the neck (18.9%) were the most affected body regions among railway workers. Age group and MSDs were shown to be significantly correlated in several body locations ($p = .044$ for the wrist, $p = .000$ for the knee, etc.).

Increasing of age, years of working experience, working hours in a day, and continuous work without taking any rest are increased for the risk of musculoskeletal disorder (Dembe et al. 2005). There is a study state that the duration of work, the ergonomic factors such as force and repetitiveness play an important role in musculoskeletal disorder and which showed that work experiences and duration of work may cause high level of musculoskeletal disorders.

CHAPTER – VI LIMITATIONS

The following limitations of the study should be taken into consideration: Since this study was carried out by my fund while I was a student, there may have been some financial limitations. For the study, information was gathered from the Rangpur division. Greater amounts of data from various regions of Bangladesh could be gathered if the investigator had more time. If possible, it might increase the validity and dependability of the outcome. Not all Bangladeshi respondents are included in this survey. As I am not an expert in statistical analysis, this research is part of my academic education. As it was a new topic area. Therefore, gathering relevant data regarding the subject was challenging, especially from Bangladesh's perspective. Since it was the researcher's first attempt, the planned survey and interviewing techniques were insufficient for collecting more detailed information from the participants.

CHAPTER – VII CONCLUSION AND RECOMMENDATION

7.1 Conclusion

The aim of the study was to determine the prevalence of musculoskeletal disorders (MSDs) and associated factors among manual workers in railway workshops in Rangpur division, Bangladesh. It is concluded that, more than half of manual workers in railway workshops in Rangpur division, Bangladesh are sufferers from lower back pain during the previous 12 months. 349 railway manual workers were chosen at random for the study. Most of the participants have not taken treatment and don‘t know about physiotherapy treatment. Work related musculoskeletal disorders (WMSDs) are among the most serious occupational hazards in many industries. In Bangladesh, musculoskeletal problems have been identified as a growing burden.

7.2 Recommendation

It was recommended that, in future studies: Different measurement tools needed to be included. I want this research to be done in railway workshops all over Bangladesh. MSDs are a serious issue that requires increased attention in developing countries manufacturing sectors. The importance of a physiotherapist in the workplace when it comes to ergonomics, worker health, MSD and WMSD prevention, get back to work initiatives, and manual intervention and prescription exercise. Positive Impact of Physiotherapy: By reducing injuries, raising productivity, lowering absenteeism, and facilitating a quicker return to work for injured workers, ergonomic training, workplace safety and education, on-site physiotherapy treatments, including exercise and manual therapy, and return to work programs were advantageous to employers, employees and countries. It is important to ensure that payers, employers, employees and countries are awareness off the crucial role physical therapists can play in occupational health.

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Appendix: A **Permission letter**

SAIC COLLEGE OF MEDICAL SCIENCE AND TECHNOLOGY

Approved by Ministry of Health and Family Welfare
Affiliated with Dhaka University

Ref : Date : .....

Ref.No: SCMST/ERB-2017-18/1-2023/29

3rd January'2024

To

Mr. Abdullah Al Maruan

1st Professional B.Sc. in Physiotherapy

Saic College of Medical Science and Technology (SCMST)

Mirpur-14, Dhaka-1216

Sub: Permission to collect data

Dear Maruan,

Ethical review board (ERB) of SCMST pleased to inform you that your proposal has been reviewed by ERB of SCMST and we are giving you the permission to conduct study entitled "Musculo-skeletal disorders and associated risk factors among manual workers in railway workshop in Rangpur division in Bangladesh" and for successful completion of this study you can start data collection from now.

Wishing you all the best.

Thanking You.

11.01.24

Head of ERB
Ethical Review Board
Saic College of Medical Science and Technology

11.01.24

Principal
Saic College of Medical Science and Technology
Mirpur-14, Dhaka-1216

Address: Saic Tower, M-1/6, Mirpur-14, Dhaka-1216, Mobile: 01936005804
E-mail: simt140@gmail.com, Web:www.saicmedical.edu.bd

SAIC COLLEGE OF MEDICAL SCIENCE AND TECHNOLOGY

Approved by Ministry of Health and Family Welfare
Affiliated with Dhaka University

Ref

Date : .....

Ref.No: *SCMST/PT/ERB-2017-18/1-2023/30*

19th January'2023

To
The Administrative Head
Central Locomotive Workshop
Parbatipur, Dinajpur.

Sub: Permission to collect data.

Dear Sir/Mam,

Ethical review board (ERB) of SCMST pleased to inform you that Abdullah Al Marnun of final year B.Sc. in Physiotherapy student from Saic College of Medical Science and Technology doing a thesis entitle of "Musculoskeletal disorders and associated risk factors among manual workers in railway workshop in Rangpur division in Bangladesh" which has been reviewed by ERB of SCMST and we are giving permission to him to conduct this study. His data collection area is railway workshop in Dinajpur, so he wants to take data from your department.

I hope you will give kind permission to collect data to complete his study successfully and oblige thereby.

Thanking You,

19.01.2023

Head of ERB
Ethical Review Board
Saic College of Medical Science and Technology

19.01.23

Principal
Saic College of Medical Science and Technology
Mirpur-14, Dhaka-1216

Address: Saic Tower, M-1/6, Mirpur-14, Dhaka-1216. Mobile: 01936005804
E-mail: saic1403@gmail.com, Web: www.saicmedical.edu.bd

SAIC COLLEGE OF MEDICAL SCIENCE AND TECHNOLOGY

Approved by Ministry of Health and Family Welfare
Affiliated with Dhaka University

Ref.No: SCMST/PT/ERB-2017-18/1-703/30 Date: .....

19th January'2023

To
The Divisional Superintendent (Workshop)
Saidpur Railway Workshop
Saidpur, Nilphamari.

Sub: Permission to collect data

Dear Sir/Mam,

Ethical review board (ERB) of SCMST pleased to inform you that Abdullah Al Mamun of final year B.Sc in Physiotherapy student from Saic College of Medical Science and Technology doing a thesis entitle of "Musculoskeletal disorders and associated risk factors among manual workers in railway workshop in Rangpur division in Bangladesh" which has been reviewed by ERB of SCMST and we are giving permission to him to conduct this study. His data collection area is railway workshop in Nilphamari, so he wants to take data from your department.

I hope you will give kind permission to collect data to complete his study successfully and oblige thereby.

Thanking You.

19.1.23

Head of ERB
Ethical Review Board
Saic College of Medical Science and Technology

19.1.23

Principal
Saic College of Medical Science and Technology
Mirpur-14, Dhaka 1216

Address: Saic Tower, M-1/6, Mirpur-14, Dhaka-1216. Mobile: 01936005804
E-mail: simt140@gmail.com. Web: www.saicmedical.edu.bd

Appendix: B Consent form (English)

Consent form (English)

Assalamualicum / Namasker,

I am Md. Abdullah Al Mamun, the 4th year B.Sc. in Physiotherapy student of Saic College of Medical Science and Technology (SCMST) under Medicine faculty of University of Dhaka. To obtain my Bachelor degree, I shall have to conduct a research and it is a part of my study. My research title is "**Musculoskeletal Disorders and Associated Factors among Manual Workers in Railway Workshops in Rangpur Division, Bangladesh**". Through this study I will find out the prevalence of musculoskeletal disorders and associated factors among manual workers in railway workshops in Bangladesh. To conduct this research some questions will be asked to the research participants. It will take you 15 to 20 minutes to complete this self administration interview. Participants are requested to participate in the study after reading the following text. To implement my research project, I need to collect data from the manual workers who participated in the study. Therefore, you will oblige me by being a part of my research.

I am committed that participating in the study won't put you in danger or harm. Anytime, without any doubt or risk, you have the full right to stop. I promise to keep all information collected from you confidential and no one's identity will ever be revealed. If you have any questions about about the study, You can contact my study's honorable supervisor, Dr. Md. Kutub Uddin (PT), B.Sc., M.Sc. (DU), Lecturer (SCMST).
Mobile: 01915454280

Do you have any questions before I start?
So, may I have your consent to procced with the interview?

Yes..... No.....

Signature of the participant & Date.....

Signature of the researcher & Date.....

Signature of the witness & Date.....

Appendix: C **Consent form (Bangla)**

সম্মতিপত্র (বাংলা)

আসসালামুআলাইকুম / নমস্কার,

আমি মোঃ আব্দুল্লাহ আল মামুন, ঢাকা বিশ্ববিদ্যালয়ের মেডিসিন অনুষদের অধীনে সাইক কলেজ অফ মেডিকেল সায়েন্স অ্যান্ড টেকনোলজি (এসসিএমএসটি) এর ৪র্থ বর্ষ বিএসসি ইন ফিজিওথেরাপির ছাত্র। আমার বিএসসি ইন ফিজিওথেরাপি ডিগ্রি সম্পন্ন করতে; আমাকে একটি গবেষণা পরিচালনা করতে হবে এবং এটি আমার অধ্যয়নের একটি অংশ। আমার গবেষণার শিরোনাম হল "**বাংলাদেশের রংপুর বিভাগে রেলওয়ে কারখানাতে হস্তচালিত কর্মীদের মধ্যে পেশি ও অস্থি সম্বন্ধীয় সমস্যা এবং সংশ্লিষ্ট কারণগুলি**"। এই অধ্যয়নের মাধ্যমে আমি বাংলাদেশের রংপুর বিভাগে রেলওয়ের কারখানাতে হস্তচালিত কর্মীদের মধ্যে পেশি ও অস্থি সম্বন্ধীয় সমস্যা এবং সংশ্লিষ্ট কারণগুলি খুঁজে বের করব। এই গবেষণা পরিচালনা করার জন্য গবেষণায় অংশগ্রহণকারীদের কিছু প্রশ্ন করা হবে। আপনার নিজের ইচ্ছাকৃত এই সাক্ষাৎকার দিতে ১৫ থেকে ২০ মিনিট সময় লাগবে। অংশগ্রহণকারীদের নিম্নলিখিত লেখা পড়ার পরে গবেষণায় অংশগ্রহণের জন্য অনুরোধ করা যাচ্ছে। আমার গবেষণা প্রকল্প বাস্তবায়ন করতে, আমাকে গবেষণায় অংশগ্রহণকারী হস্তচালিত কর্মীদের কাছ থেকে তথ্য সংগ্রহ করতে হবে। অতএব, আপনি আমার গবেষণায় অংশ হয়ে আমাকে বাধিত করবেন।

আমি প্রতিশ্রুতিবদ্ধ যে, অধ্যয়নে অংশ নেওয়া আপনাকে বিপদ বা ক্ষতির মধ্যে ফেলবে না। যে কোনো সময়, কোনো সন্দেহ বা ঝুঁকি ছাড়াই, আপনার এটাকে বন্ধ করার সম্পূর্ণ অধিকার আছে। আমি আপনার কাছ থেকে সংগ্রহ করা সমস্ত তথ্য গোপন রাখার প্রতিশ্রুতি দিচ্ছি এবং কারও পরিচয় কখনও প্রকাশ করা হবে না। অধ্যয়ন সম্পর্কে আপনার কোন প্রশ্ন থাকলে, আপনি আমার অধ্যয়নের সম্মানিত সুপারভাইজার, ডাঃ মোঃ কুতুব উদ্দিন (পিটি), বি.এস.সি., এম.এস.সি. (ঢাবি), লেকচারার (এসসিএমএসটি) এর সাথে যোগাযোগ করতে পারেন।

মোবাইল: ০১৯১৫৪৫৪২৮০

আমি শুরু করার আগে আপনার কোন প্রশ্ন আছে?

তাহলে, আমি কি আপনার সাক্ষাতকারের জন্য সম্মতি পেতে পারি?

হ্যাঁ ..... না .....

অংশগ্রহণকারীর স্বাক্ষর এবং তারিখ.....

গবেষকের স্বাক্ষর এবং তারিখ.....

সাক্ষীর স্বাক্ষর ও তারিখ.....

Appendix: D	**Questionnaire (English)**

Questionnaire (English)

Musculoskeletal Disorders and Associated Factors among Manual Workers in Railway Workshops in Rangpur Division, Bangladesh.

Respondent ID: | | | . Date:……./……../…….

Name of respondent:…….

Address:…….

Mobile number:…….

Section 01: Socio-Demographic Related Question

Q.No.	Questions	Responses	Code
1.	How old are you?	…….……..Years	
2.	What is your level of education?	1 = Secondary 2 = Higher Secondary 3 = Bachelors 4 = Others	
3.	What is your types of family?	1= Nuclear 2 = Extended 3 = Others	
4.	What is your marital status?	1 = Married 2 = Unmarried 3 = Others	

5.	Please tell your monthly income (BDT).	Taka:……...	
6.	What is your religious?	1 = Muslim 2 = Hindu 3 = Buddhist 4 = Christian 5 = Others	
7.	What is your BMI (Kg/m^2)? Weight in Kg:…….. Height in Metre:……..	BMI……	

Section 02: Work related information

Q.NO.	Questions	Responses	Code
8.	How long is your experience in this job?	……..Years	
9.	How long do you work?	Hours:……...	
10.	Please tell your workplace activities.	1 = Heavy lifting 2 = Manual handling 3 = Prolong sitting and standing 4 = Repetitive tasks 5 = All types of work	

11.	Please tell your posture while working.	1 = Sitting 2 = Standing 3 = Both (Sitting + Standing) 4 = Bending 5 = Twisting 6 = Others	
12.	How is your exertion during the office time?	1 = Mild 2 = Moderate 3 = High	
13.	Did you receive any training after entering the job? (If your answer is Yes then answer to the question no 14)	1 = No 2 = Yes	
14.	Is there a reduced risk of injury or musculoskeletal disorders after training?	1 = No 2 = Yes	

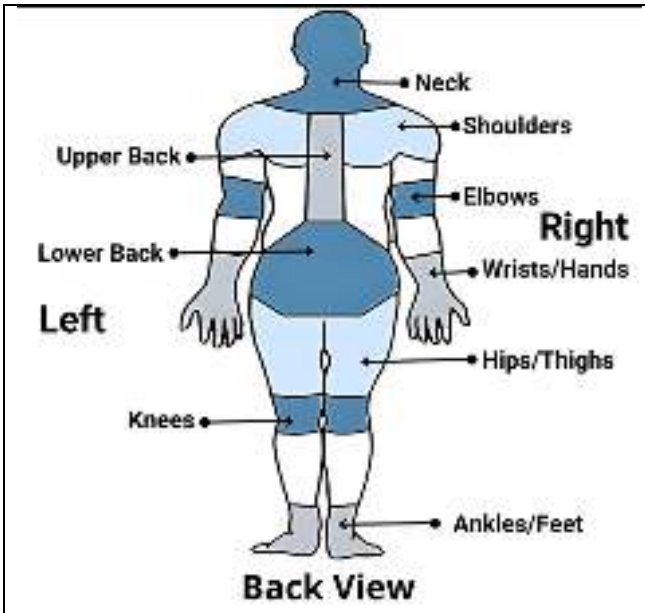
Section 03: Systemic disorders related information

15.	Do you have any Cardiovascular system problems? (e.g. Previous Heart attack / Coronary artery disease / Heart valve disease) Yes = Any one or more than one.	1 = No 2 = Yes	
16.	Do you have any Pulmonary problems? (e.g. Asthma / Pneumonia / Tuberculosis) Yes = Any one or more than one.	1 = No 2 = Yes	

17.	Do you have any ENT problems? (e.g. Tonsillitis / Ear infections / Sleep apnoea / Hearing loss /Allergies) Yes = Any one or more than one.	1 = No 2 = Yes	
18.	Do you have any Metabolic Syndrome? (e.g. Diabetes / Hypertension / High cholesterol) Yes = Any one or more than one.	1=No 2=Yes	

Section 04: Musculoskeletal discomfort related information

(Based on Nordic Questionnaire (Kourinka et al.1987))



Picture: In this picture you can see the Approximate position of the parts of the body referred to in the table. Limits are not sharply defined, and certain parts overlap. You should decide for yourself in which part you have or have had your trouble (if any).

Table: Please answer by putting an "X" in the appropriate box - one "X" for each question. You may be in doubt as to how to answer, but please do your best anyway. Note that column 1 of the questionnaire is to be answered even if you have never had trouble in any part of your body; columns 2 and 3 are to be answered if you answered yes in column 1.

To be answered by everyone	**To be answered by those who have had trouble**	
Have you at any time during **the last 12 months** had trouble (ache, pain, discomfort, numbness) in:	Have you at any time during the **last 12 Months been Prevented from doing your normal work** (at home or away from home) because of the trouble?	Have you had trouble at any time during **the last 7 days?**
Neck ☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
Shoulders ☐ No ☐ Yes, right shoulder ☐ Yes, left shoulder ☐ Yes, both shoulders	☐ No ☐ Yes	☐ No ☐ Yes
Elbows ☐ No ☐ Yes, right elbow ☐ Yes, left elbow ☐ Yes, both elbows	☐ No ☐ Yes	☐ No ☐ Yes

Wrists/Hands ☐ No ☐ Yes, right wrist/hand ☐ Yes, left wrist/hand ☐ Yes, both Wrists/ hands	☐ No ☐ Yes	☐ No ☐ Yes
Upper Back ☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
Lower Back (small of back) ☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
One or Both Hips/ Thighs ☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
One or Both Knees ☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes

One or Both Ankles/Feet ☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes

Appendix: E	**Questionnaire (Bangla)**

প্রশ্নপত্র (বাংলা)

শিরোনামঃ বাংলাদেশের রংপুর বিভাগে রেলওয়ে কারখানাতে হস্তচালিত কর্মীদের মধ্যে পেশি ও অস্থি সম্বন্ধীয় সমস্যা এবং সংশ্লিষ্ট কারণগুলি।

উত্তরদাতারআইডি: | | | তারিখ: ...../...../.....

উত্তরদাতার নাম: .....

ঠিকানা: .....

মোবাইল নম্বর: .....

<u>বিভাগ ০১: সামাজিক – জনসংখ্যাগত সম্পর্কিত প্রশ্ন</u>

প্রশ্ন নং	**প্রশ্ন**	**প্রতিক্রিয়া**	**কোড**
১.	আপনার বয়স কত?	..... বছর	
২.	আপনার শিক্ষাগত যোগ্যতা বলুন।	১ = মাধ্যমিক ২ = উচ্চ মাধ্যমিক ৩ = স্নাতক ৪ = অন্যান্য	
৩.	আপনি কি ধরনের পরিবারে বাস করেন?	১ = একক ২ = যৌথ ৩ = অন্যান্য	
৪.	আপনার বৈবাহিক অবস্থা কি?	১ = বিবাহিত ২ = অবিবাহিত ৩ = অন্যান্য	

৫.	অনুগ্রহ করে আপনার মাসিক আয় বলুন।	..... টাকা	
৬.	আপনার ধর্ম কি?	১ = মুসলিম ২ = হিন্দু ৩ = বৌদ্ধ ৪ = খ্রিস্টান ৫ = অন্যান্য	
৭.	আপনার বিএমআই (Kg/m^2) কত? কেজিতে ওজন: ..... মিটারে উচ্চতা:	বিএমআই:	

<u>বিভাগ ০২: কাজের সাথে সম্পর্কিত তথ্য</u>

প্রশ্ন নং	**প্রশ্ন**	**প্রতিক্রিয়া**	**কোড**
৮.	আপনি কত বছর যাবৎ চাকরি করেন?	.....বছর	
৯.	আপনি দৈনিক কতক্ষণ কাজ করেন?	ঘন্টায়:	
১০.	অনুগ্রহ করে আপনার কর্মক্ষেত্রে কাজের ধরণ বলুন।	১ = ভারী উত্তোলন ২ = হস্তচালিত কাজ ৩ = দীর্ঘক্ষণ বসে এবং দাঁড়িয়ে থেকে ৪ = বারবার একই কাজ করা ৫ = সব ধরনের কাজ	

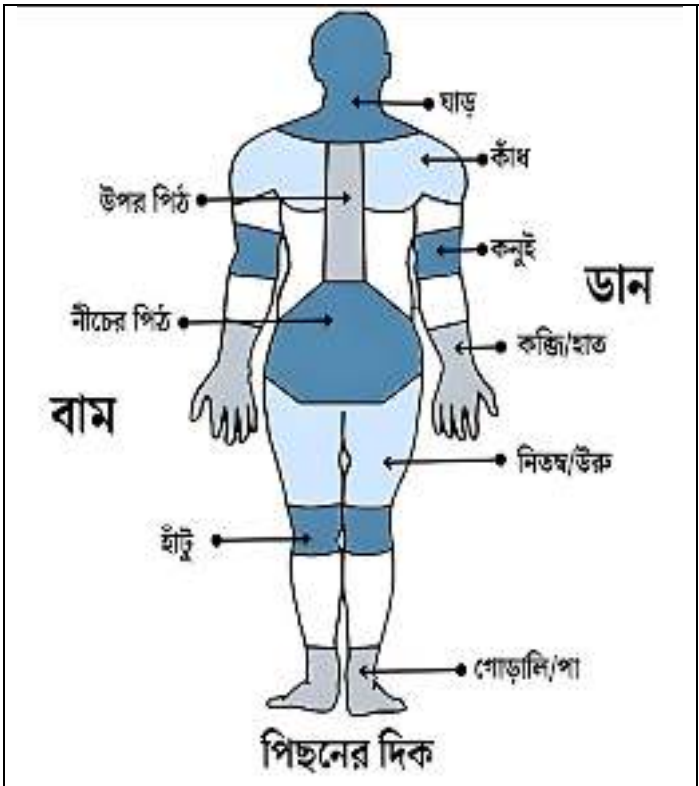
১১.	কাজ করার সময় আপনার অঙ্গভঙ্গি বলুন।	১ = বসে থাকা ২ = দাঁড়িয়ে থাকা ৩ = উভয় (বসা + দাঁড়ানো) ৪ = বাঁকানো ৫ = মোচড়ানো ৬ = অন্যান্য	
১২.	কর্মক্ষেত্রে আপনার পরিশ্রম কেমন হয়?	১ = হালকা ২ = মধ্যম ৩ = উচ্চ	
১৩.	চাকরিতে প্রবেশের পর আপনি কি কোনো প্রশিক্ষণ নিয়েছেন? (যদি আপনার উত্তর হ্যাঁ হয় তাহলে ১৪ নং প্রশ্নের উত্তর দিন)	১ = না ২ = হ্যাঁ	
১৪.	প্রশিক্ষণ নেওয়ার পর আঘাত বা পেশি ও অস্থি সম্বন্ধীয় সমস্যার ঝুঁকি কমেছে কিনা?	১ = না ২ = হ্যাঁ	

বিভাগ ০৩: সিস্টেমিক ব্যাধি সম্পর্কিত তথ্য

১৫.	আপনার কি হৃদরোগজনিত কোন সমস্যা আছে? (যেমন: পূর্ববর্তী হার্ট অ্যাটাক / করোনারি আর্টারি ডিজিজ / হার্ট ভালভ ডিজিজ) হ্যাঁ = যে কোনো এক বা একাধিক।	১ = না ২ = হ্যাঁ	
১৬.	আপনার কি ফুসফুসের সমস্যা আছে? (যেমন: অ্যাজমা / নিউমোনিয়া / যক্ষ্মা) হ্যাঁ = যে কোনো এক বা একাধিক।	১ = না ২ = হ্যাঁ	
১৭.	আপনার কি কোন নাক-কান-গলার সমস্যা আছে? (যেমন: টনসিলাইটিস / কানের সংক্রমণ / অনিদ্রা / শ্রবণশক্তি হ্রাস / অ্যালার্জি) হ্যাঁ = যে কোনো এক বা একাধিক।	১ = না ২ = হ্যাঁ	
১৮.	আপনার কি কোনো বিপাকীয় লক্ষণ আছে? (যেমন: ডায়াবেটিস / উচ্চ রক্তচাপ / উচ্চ কোলেস্টেরল) হ্যাঁ = যে কোনো এক বা একাধিক।	১ = না ২ = হ্যাঁ	

বিভাগ ০৪: পেশি ও অস্থি সম্বন্ধীয় অসুবিধা সম্পর্কিত তথ্য

(নর্ডিক প্রশ্নাবলীর উপর ভিত্তি করে (Kourinka et al.1987))



ছবি: এই ছবিতে আপনি দেখতে পারেন সারণীতে উল্লেখ করা শরীরের অংশগুলির আনুমানিক অবস্থান। সীমাগুলি তীক্ষ্ণভাবে সংজ্ঞায়িত করা হয় না, এবং কিছু অংশ ওভারল্যাপ হয়। আপনার নিজের জন্য সিদ্ধান্ত নেওয়া উচিত যে, কোন অংশে আপনার সমস্যা আছে বা আপনার সমস্যা (যদি থাকে)।

ছক: অনুগ্রহ করে উপযুক্ত বাক্সে একটি "X" বসিয়ে উত্তর দিন - প্রতিটি প্রশ্নের জন্য একটি "X"। আপনি কীভাবে উত্তর দেবেন তা নিয়ে সন্দেহ থাকতে পারে, কিন্তু যেভাবেই হোক আপনি যথাসাধ্য চেষ্টা করুন। "মনে রাখবেন যে প্রশ্নাবলীর কলাম ১ উত্তর দিতে হবে এমনকি যদি আপনার শরীরের কোন অংশে কখনো সমস্যা না হলেও; কলাম ২ এবং ৩ এর উত্তর দিতে হবে যদি আপনি কলাম ১-এ হ্যাঁ উত্তর দেন।"

প্রত্যেকের উত্তর দিতে হবে	**যারা সমস্যায় পড়েছেন তাদের উত্তর দিতে হবে**	
গত ১২ মাসে আপনার কি কোন সময়ে সমস্যা হয়েছে (ব্যথা, অস্বস্তি, অসাড়তা)?	গত ১২ মাসের মধ্যে কোন সময় সমস্যাটির কারণে আপনার স্বাভাবিক কাজ (বাড়িতে বা বাড়ির বাইরে) করতে অসুবিধা হয়েছে?	আপনি কি গত ৭ দিনে কোন সময়ে সমস্যায় পড়েছেন?
ঘাড় ☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ
কাঁধ ☐ না ☐ হ্যাঁ, ডান কাঁধ ☐ হ্যাঁ, বাম কাঁধ ☐ হ্যাঁ, উভয় কাঁধ	☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ
কনুই ☐ না ☐ হ্যাঁ, ডান কনুই ☐ হ্যাঁ, বাম কনুই ☐ হ্যাঁ, উভয় কনুই	☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ

কব্জি/হাত ☐ না ☐ হ্যাঁ, ডান কব্জি/হাত ☐ হ্যাঁ, বাম কব্জি/হাত ☐ হ্যাঁ, উভয় কব্জি/হাত	☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ
উপর পিঠ ☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ
নীচের পিঠ ☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ
এক বা উভয় নিতম্ব/উরু ☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ
এক বা উভয় হাঁটু ☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ

এক বা উভয় গোড়ালি/পা ☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ	☐ না ☐ হ্যাঁ

Appendix: F	Study area map

Appendix: G	Picture

Picture of the Study area:

Data collection picture:

Picture of different types of work perform by Railway manual workers:

Figure: Welder

Figure: Fitter

Appendix: H **Gantt chart**

Activities/ Month	July 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Mar 23	App 23	May 23	Jun 23
Proposal Presentation												
Introduction												
Literature Review												
Methodology												
Data collection												
Data Analysis												
Result												
1st progress presentation												
Discussion												
Conclusion and Recommendation												
2nd progress presentation												
Communication with supervision												
Final Submission												