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Prevalence Of Musculoskeletal Discomfort Among Construction Workers In Nagpur City Using Nordic Musculoskeletal Questionnaire

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1. Abstract:

Background: The Construction industry is the largest hub for employment. The workers are engaged in intensive and physically demanding jobs. Tasks such as stooping, kneeling, and awkward postures cause micro traumas leading to pain amongst workers.

Aim: To know the prevalence of musculoskeletal discomfort among the construction workers in Nagpur city using the Nordic Musculoskeletal Questionnaire.

Methodology: 105 participants were recruited by using convenient sampling. 25-35 years was the age criteria specified. Inclusion and exclusion criteria were formed, and the assessment was done using the Nordic Musculoskeletal Questionnaire.

Results and Conclusion: The results showed that the upper back was the most affected region of the body, followed by the knee and shoulder. Addressing these issues will help protect workers' well-being while also enhancing productivity and safety in the construction industry.

Index Terms: *Construction* workers, Nordic Musculoskeletal Questionnaire. Work related msculoskeletal discomfort. Prevalence

I. INTRODUCTION

The health and safety of construction workers is a major social challenge faced by society. Further, achieving zero accidents is challenging [1]. The construction industry is India's biggest hub after the agricultural industry, making it one of the major employment industries [2]. The tasks performed at construction sites require static and awkwardly dynamic postures for prolonged periods of time [3]. The workers employed in these unorganized sector industries are very susceptible to developing musculoskeletal pain, as they do not receive social, financial, and health benefits and are often illiterate, unlike the organized sectors, as the majority of employers hail from poor socioeconomic backgrounds [4].

Broadly, they are divided into building construction workers and civil engineering workers [5]. The construction industry continues to be the most dangerous field to work in; as a result, developing health problems is highly prevalent because of the highly demanding work environment [6]. The workers employed here are very susceptible to developing several environmental and physical risk factors, like working in

extreme climatic conditions and repetitive movements, which cause microtraumas, vibration, heavy lifting, and awkward postures [7]. These conditions cause the development of musculoskeletal disorders, which can cause long-term pain, disability, and reduced work capacity. These disorders usually develop slowly due to repetitive strain and overuse [8].

These usually develop when physical stress could not be handled by the body anymore. Individual factors like poor fitness levels, poor nutrition and dehydration, age, and weight [9]. Physical factors like lifting, pushing, pulling, extreme temperatures, poor lifting strategies, and insufficient rest bouts and psychosocial factors like high workload, strict deadlines, and poor work relationships contribute to the risk of development of work-related disorders [10]. The increasing prevalence of such disorders is mainly due to awareness and ergonomic education. A short-term and mobile workforce, poor communication between contractors and subcontractors, changing work environments, and workers using their own tools rather than standardized ones are some of the challenges faced [11]. Consideration of occupational and individual risk factors is very essential for preventing musculoskeletal disorders. Ultimately, recognition of key risk factors will surely develop practical ergonomics and safety solutions.

The Nordic Musculoskeletal Questionnaire is highly utilized to quantify the severity, duration, frequency, and prevalence of discomfort symptoms. Moreover, this study would help in identifying the prevalence of disorders. The presence of an easy, inexpensive tool was necessary to have an assessment tool to identify complaints of workers [12]. Therefore, the aim of the study was to find the prevalence of musculoskeletal discomfort and associated risk factors among construction workers in Nagpur city.

2 Research Question:

What is the prevalence of musculoskeletal discomfort among construction workers using the Nordic Musculoskeletal Questionnaire?

3. Objective:

- To determine the percentage of musculoskeletal discomfort among construction workers in Nagpur city using the Nordic Musculoskeletal Questionnaire.
- To determine the prevalence of musculoskeletal discomfort among the construction workers in Nagpur city using the Nordic Musculoskeletal Questionnaire

4. Materials and Methods:

4.1 Study Design: Cross-sectional Observational Study
4.2 Study Site: Construction site workers of Wardhaman Nagar, Netaji Nagar, Bhandewadi
4.3 Study Population: Construction workers aged 25-35 years
4.4 Sampling Size: 105 participants
4.5 Study duration: 6 months
4.6 Sampling Technique: Convenient Sampling
4.7 Study Tools:

It included socio-demographic details of participants, gender, risk factors, past medical and medication history, current musculoskeletal complaints, diagnosis, and the Nordic questionnaire.

5. Study Criteria:

5.1 Inclusion criteria:

Both male and female genders, aged 25-35 years

Having worked as a construction worker for more than 5 years.

5.2 Exclusion criteria

Those suffering from radiculopathies, myelopathies, and other disabilities.

Those who have a history of physical trauma in the past 6 months.

Those with cognitive impairments.

Those not willing to participate in the study

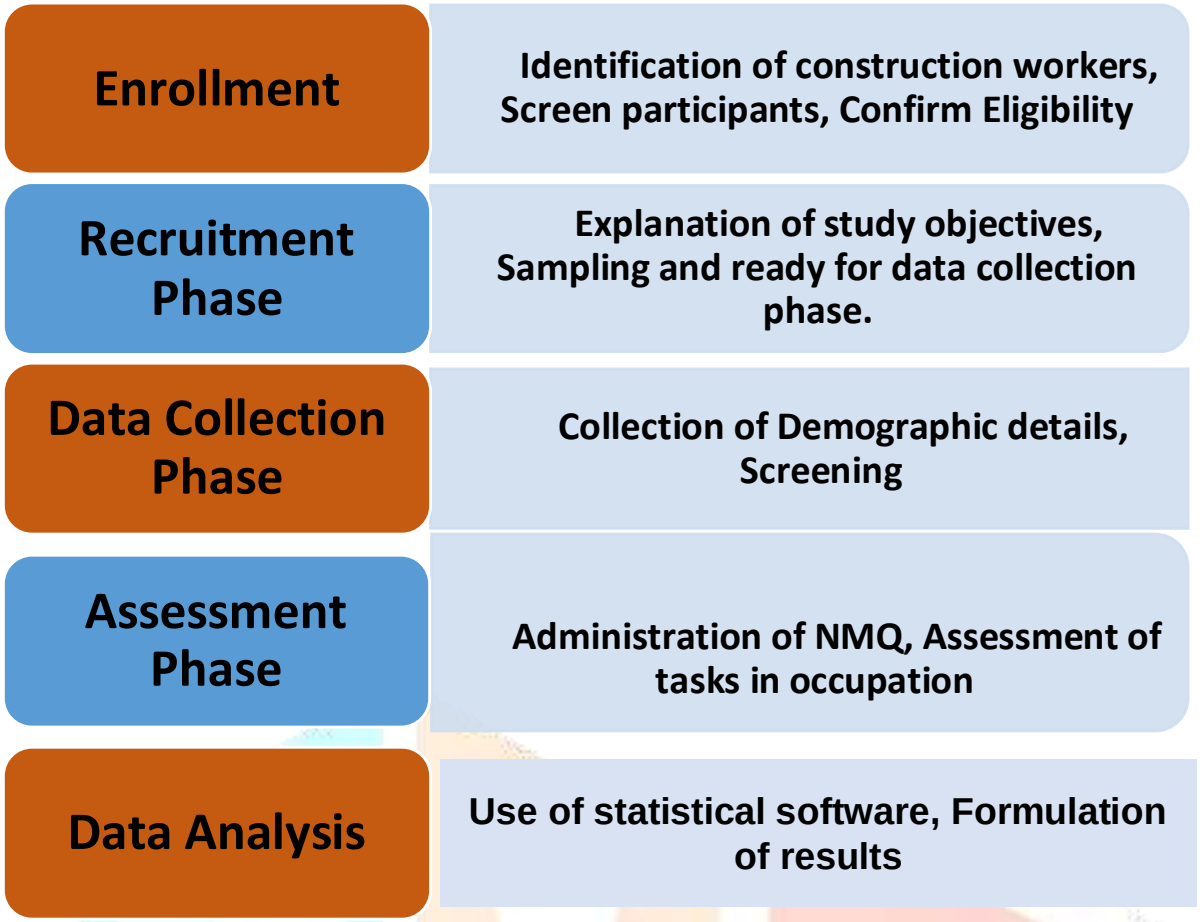
6. Nordic Questionnaire:

It is a valid and standardized screening tool developed to assess musculoskeletal symptoms in different parts of the body. Kuorinka and his colleagues with the support of ministers of the Nordic Council. It consists of simple, general questionnaires that are validated internationally. It consists of 28 multiple-choice questions. The first part refers to symptoms, whereas the second part refers to symptoms in three parts (neck, shoulder, and lower back). Qualitative variables are also helpful for better evaluation.

Further, Dickinson et al. validated a new and improvised version of the questionnaire. Previously, only the percentage of symptoms and site could be identified. Dickinson et al. proposed a newer way of interpreting the results. Further, changes by Baron et al. and Kaewbonchoo were done, and no contraindications were found. Further, many more translations, validations, and adaptations were made with satisfactory results. This questionnaire is used to identify locomotion disorders in occupational workers. The test-retest reliability (k=0.595 (95% confidence interval: 0.183-1.000), Internal consistency 0.835 (95%: 0.807-0.86) [13].

Study Procedure:

Prior to commencement of study, authorization from authorities was obtained from appropriate regulatory and institutional authorities. The study protocol was meticulously developed. Further, as primary data, utilization of the Nordic Musculoskeletal Questionnaire was done. Participants were informed about the study objectives, procedures, and requirements. Moreover, written consent was obtained from each participant, and they were enrolled in the study. Further, appropriate time was allotted for completion of the questionnaires, and the data extracted was analyzed with relevant statistical tests. Depicted in (**Figure 1).**



Flowchart Figure 1**:** Describing Study Procedure

Data Collection Sheet

Face-to-face interviews, physical examinations, and targeted approaches were used to collect data in order to provide inclusive and comprehensive coverage.

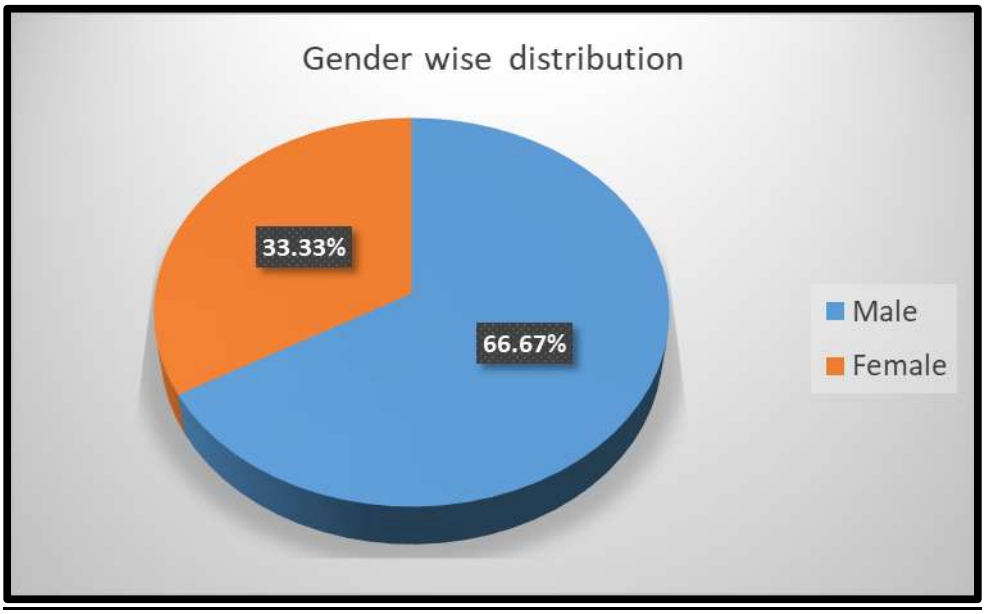
Data Analysis:

The obtained data will be entered through a Microsoft Excel spreadsheet.

7. Results:

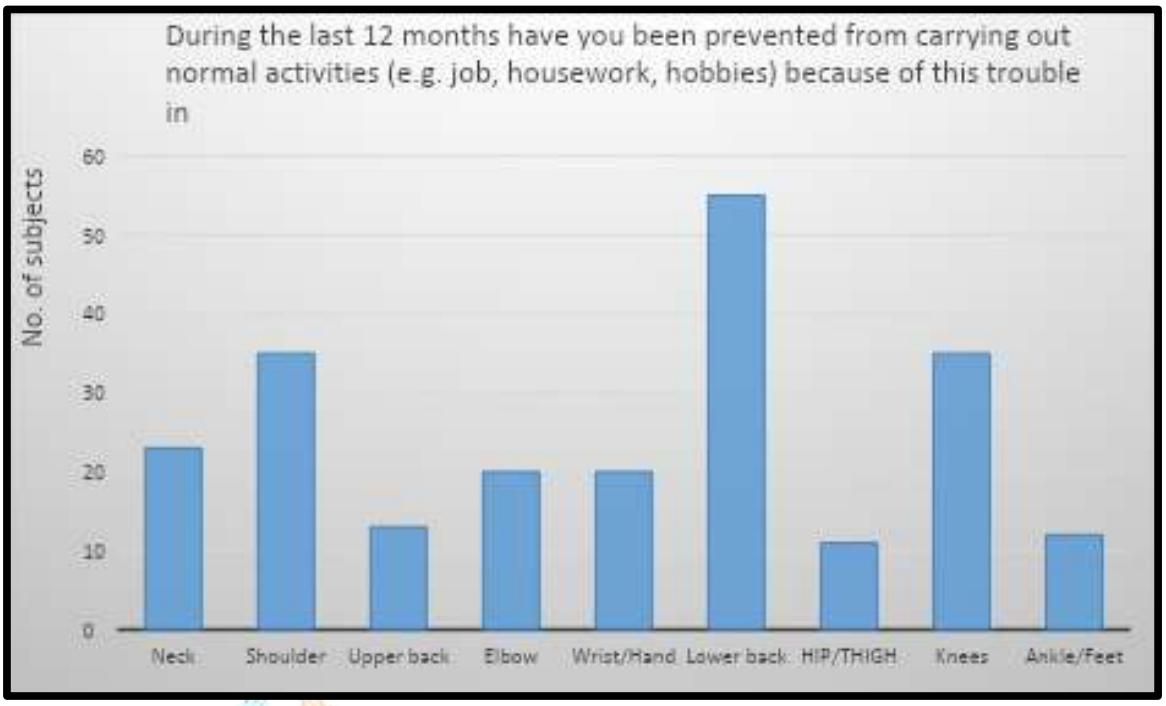
The gender distribution of the study participants is presented in **Graph 1**. The data included a total of 105 subjects, in which 70 were male and 35 were female workers. Question 1 deals with the results of our study, which conclude that the lower back region was the most affected area due to pain (59.05%), followed by the knee, hand/wrist, and hip/thigh. It is represented in (**Graph 2).** Further, in Question II, it was found that 52.38% of workers were prevented from doing normal activities because of trouble in different parts of the body **(Graph 3) (Table 1)** Moreover, Question III dealt with the percentage of people visiting physicians. Around 28.57% have seen a physician due to trouble in the lower back, followed by knees (13.33%) and shoulders (**Graph 4**).

Question 4 dealt with the experience of pain during the last 7 days. It was found that, from (**Graph 5**), the highest number of people, i.e., 42.86%, had trouble in their lower back, followed by knees (24.76%), shoulders (20%), and others. Question 5 dealt with the graph **(Graph 6) (Table 2).** It was found that the overall prevalence of musculoskeletal discomfort among construction workers was 45.48% in the lower back, followed by the knee (29.05%), shoulder (16.19%), wrist/hand (12.38%), ankle/feet (10.71%), neck (10.24%), hip/thigh (9.52%), elbow (4.05%), and upper back (3.57%), respectively.



Graph 1: Gender-wise distribution

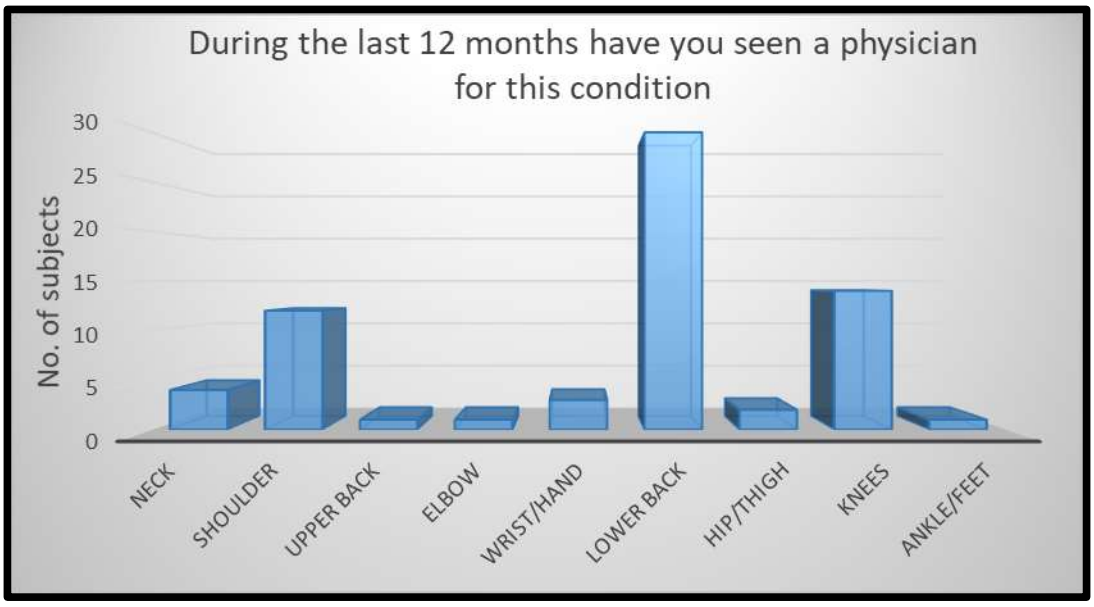
Graph 2: Demonstrating pain during last 12 months



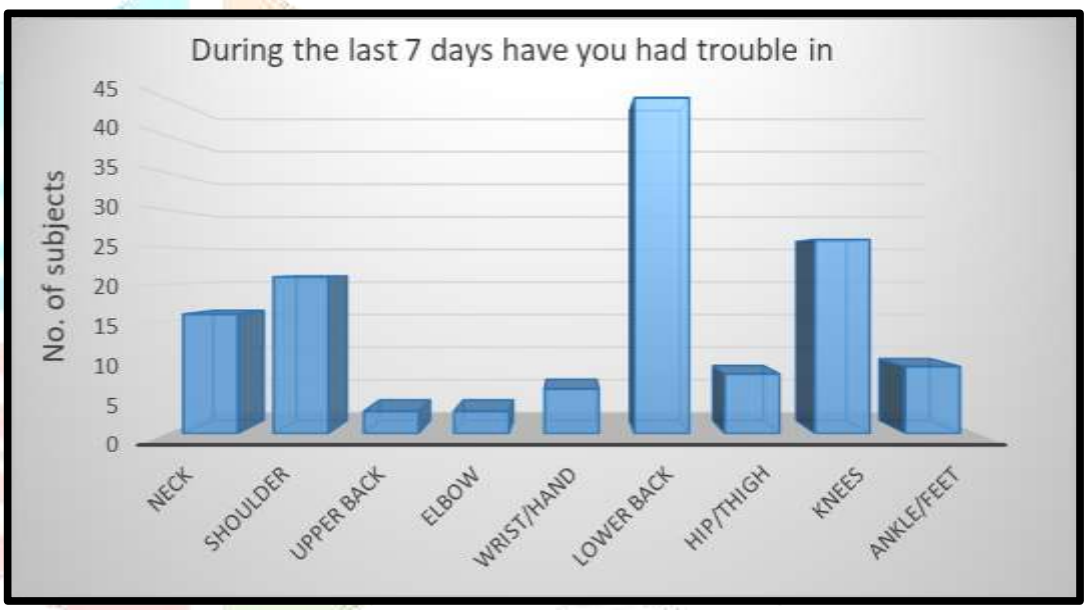
Graph 3: Showing prevalence of WRMSD pain which prevented normal activities

Body parts	No. of subjects	Percentage
Neck	23	21.90
Shoulder	35	33.33
Upper back	13	12.38
Elbow	20	19.05
Wrist/Hand	20	19.05
Lower back	55	52.38
HIP/THIGH	11	10.48
Knees	35	33.33
Ankle/Feet	12	11.43

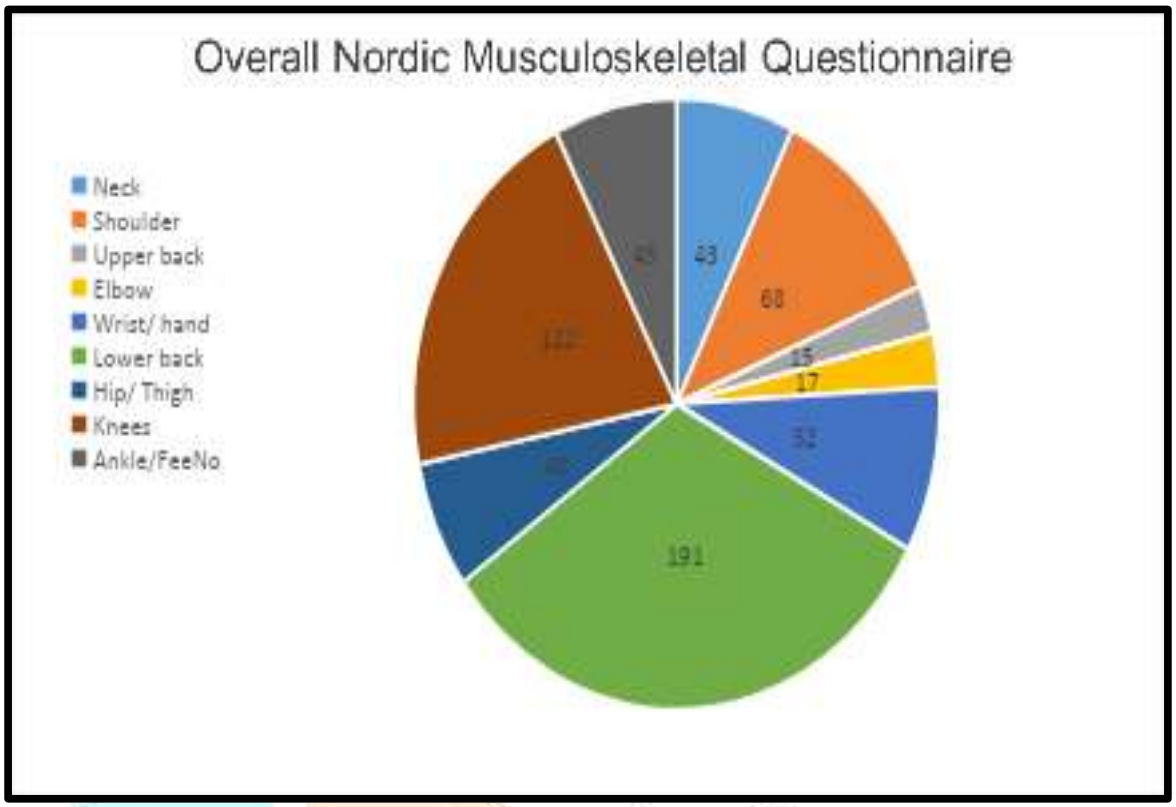
Table 1: Demonstrating Showing prevalence of WRMSD pain which prevented normal activities



Graph 4: Showing visit to physician due to pain in last 12 months



Graph 5: Prevalence of troubled pain in last 7 days



Graph 6: Overall Nordic Musculoskeletal Questionnaire

Body parts	No. of subjects	Percentage
Neck	43	10.24
Shoulder	68	16.19
Upper back	15	3.57
Elbow	17	4.05
Wrist/Hand	52	12.38
Lower back	191	45.48
Hip/Thigh	40	9.52
Knees	122	29.05
Ankle/Feet	45	10.71

Table 2: Overall Nordic Musculoskeletal Questionnaire.

8. Discussion:

Work-related musculoskeletal disorders are very prevalent in construction workers. These disorders further affect the anatomical structures of the body, resulting in tingling and pain around the various regions of the body. The causative factors are repetitive micro traumas, awkward slumped postures, and high force levels. The Nordic Questionnaire was used for identification and assessment in workers. The present study was proposed to find the prevalence of work-related musculoskeletal disorders in Nagpur city. A total of 105 construction workers were recruited for the study, aged 25-35 years. We found the lower back had the highest prevalence of pain in construction workers.

The results of our study align with the study conducted by Holmström et al. (2003), which reported that lower back symptoms were highly common among construction workers in the Swedish population. Lower back pain (59.05%) was the most common complaint among workers who had discomfort in the previous 12 months, followed by knee pain. These results are consistent with previous cross-sectional research that discovered a significant prevalence of musculoskeletal issues among construction workers [14]. Further, Bodhare et al, also conducted a study where he stated the higher prevalence of musculoskeletal disorders in the lower back and knee at around 78.8% and 77%. In their study, knee pain was the second most common complaint after lower back pain [15]. This finding is in agreement with those of Merlino et al. (2003), who reported a high prevalence of knee pain (38.4%) after low back pain in their samples of young construction workers [16]. Further study done by Kashif et al. (2022) also supported our findings, who also reported the highest prevalence of musculoskeletal discomfort in the lower back (17%) and the lowest in the upper back (3%) over the previous seven days [17].

Our study had 66.67% males and 33.33% females, which indicates a higher prevalence of males in construction industries. Our findings are supported by Madikizela & Haupt (2010), who confirmed that most construction firms employed a small number of women because the task was strenuous and physically demanding [18]. Also, Sang & Powell (2012) reported that the construction industry remains one of the most male-dominated sectors worldwide [19]. Physical risk factors such as awkward posture and related psychosocial factors were identified by Holstrom et al. (2005) in their study of MSDs among Scandinavian construction workers.

Due to a lack of ergonomic training, construction workers in India sometimes labor long hours with inappropriate loads in awkward positions. Our findings indicate that workers with repetitive motions, lengthy workdays, little rest, and uncomfortable postures had a significant prevalence of musculoskeletal problems. When workers executed the same motion too frequently, too quickly, and for an extended period of time, these situations were particularly dangerous since they utilized the same joints and muscle groups [20].

The PSHSA (2012) emphasizes reducing musculoskeletal disorders by lowering loads instead of lifting and using proper lifting techniques. Schneider et al. (2001) reported a markedly higher prevalence of pain and discomfort in experienced workers, reasons likely being sustained poor postures, vibration, advancing age, and cumulative physical and psychological stressors, along with inadequately designed physical working environments [21]. Similarly, Toole and Gambatese et al. (2008) underscored the importance of integrating health and safety considerations into the early stages of construction project design [22].

The work management strategies for workers at work stations include planning, reducing fatigue levels, and working in shifts. Pre-planning is mandatory for broader planning [23]. However, Our had a few limitations, like a higher chance of recall bias, being limited to a certain geographical location, limited generalizability due to age constraints, and a small sample size. The efficacy of ergonomics training as an interventional study can be done on construction workers in Nagpur city.

9. Conclusion:

These results highlight the importance of early identification and preventive strategies, including ergonomic improvements, health awareness, and regular medical support. Addressing these issues will help protect workers' well-being while also enhancing productivity and safety in the construction industry. We found that work-related musculoskeletal pain is prevalent in the low back, knees, and shoulders among construction workers.

IX: Acknowledgement: I would like to thank all the participants for being part of my study. I would like to thank my guide for helping me formulate my study.

X: Conflict of Interest: None

XI: Statement of Informed Consent: Written informed consent was obtained from all participants before commencement of the study.

XII. Abbreviations:

WRMDS: Work-related Musculoskeletal disorders

PSHA: Proper lifting techniques and lowering loads

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