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PREVALENCE OF CERVICAL AND UPPER EXTREMITY DISCOMFORT AND FUNCTIONAL LIMITATION RELATED TO REPETITIVE HEAD LOADING AMONG CONSTRUCTION LABOR

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Abstract

Background: *Construction laborers frequently engage in repetitive head loading activities, such as carrying heavy materials like bricks, cement, and sand on their heads. This occupational practice places significant mechanical stress on the cervical spine and upper extremities, potentially leading to chronic musculoskeletal discomfort and functional impairment. Despite the high prevalence of this practice in developing countries like Pakistan, limited research has been conducted on its associated health consequences among construction workers.*

Objective: *To determine the prevalence of cervical and upper extremity discomfort and functional limitation associated with repetitive head loading among construction laborers.*

Methodology: *A descriptive cross-sectional study was conducted in the general population of Jalal Pur Jattan city from May to August 2023. Male Pakistani nationals aged 20-35 years were included in the study. A pretested Nordic questionnaire was used to collect information regarding cervical and upper extremity discomfort as well as functional limitation related to head loading. All participant queries regarding the questionnaire were addressed prior to data collection.*

Results: *Among the participants, 156 (42.16%) reported experiencing neck pain during the last 12 months, while 214 (57.8%) reported trouble in the neck during the same period. Additionally, 68 (18.4%) experienced neck trouble within the last 7 days. Regarding shoulder discomfort, 149 (40.3%) reported shoulder pain during the last 12 months, 217 (58.6%) reported trouble in the shoulder during the last 12 months, and 87 (23.5%) experienced shoulder trouble within the last 7 days.*

Conclusion: *The study concludes that there is a high prevalence of cervical and upper extremity discomfort and functional limitation associated with repetitive head loading among construction laborers. The findings indicate that laborers who frequently lift heavy objects on their heads commonly experience cervical issues, neck pain, shoulder pain, elbow pain, wrist/hand pain, and upper back pain. Furthermore, these musculoskeletal issues negatively affect the range of motion in affected individuals.*

Keywords: *Cervical discomfort, Construction labor, Functional limitation, Head loading, Upper extremity*

INTRODUCTION

Building construction is a significant, dynamic, and complex industrial sector that employs millions of people globally. This industry is essential for infrastructure development. Construction workers engage in a variety of professions, including masons, cement mixers, plumbers, electricians, carpenters, and crane operators (1, 2). Musculoskeletal disorders (MSDs) pose a serious health challenge to construction workers and the broader public. The construction industry is renowned for its occupational risks, hazards, and associated detrimental health effects. Workers in various construction occupations are susceptible to different work-related MSDs (3).

Work-related musculoskeletal disorders (WMSDs) are the most common occupational health issues affecting manual workers. Construction workers, including rebar workers, bricklayers, and roofers, are frequently exposed to elevated physical risk factors due to the nature of their work. These risk factors include repetitive motions (lifting and lowering), awkward postures, and heavy lifting, which are the primary causes of WMSDs (3).

Although neck pain-related absenteeism incidents are less common than low back pain incidents, they still have a substantial impact on morbidity in many working populations (4). These disorders are classified as work-related musculoskeletal disorders. According to Hagberg and Wegman (1987), occupations requiring physically demanding work activities include healthcare, construction, agriculture, and manual material handling. Cervical spine disorders constitute the majority of disorders associated with degenerative disc diseases. Musculoskeletal symptoms may be influenced either directly or indirectly by physical strain and stress symptoms, which are secondary to psychosocial variables (5).

In the United States, MSDs are a major contributor to work-related disabilities, as well as to illnesses and accidents resulting in lost work time. The construction sector reports the second-highest number of occupational illnesses and injuries. It has been reported that the actual number of cases occurring in the workplace may be higher, as many MSDs go unreported (6).

The prevalence and incidence of MSDs vary across different populations and depend on multiple factors, including the levels of various occupational risks across different vocations (7). Long-term biomechanical stress on the body, such as heavy lifting, poor posture, and repetitive motions, can lead to muscle and joint discomfort or other functional issues (8).

MATERIALS AND METHODS

STUDY DESIGN AND SETTING

A descriptive cross-sectional study was conducted in the general population of Jalal Pur Jattan city. The study was carried out over a period of four months (April to July) following the approval of the study from Ethical Review Board.

SAMPLE SIZE

A total of 370 participants were enrolled in the study. The sample size was calculated using the following formula:

$n = [Z^2(1-\alpha/2) \times P(1-P)] / d^2$

where "P" is the anticipated population proportion, "d" is the absolute precision required, and "n" is the sample size. A convenient non-probability sampling technique was employed.

INCLUSION AND EXCLUSION CRITERIA

Males aged 20-35 years with a working experience of 2 to 5 years were included in the study (9, 10). Participants were excluded if they had experienced trauma to the cervical spine or upper extremity within the past 6 months, undergone cervical, shoulder, or upper extremity surgical procedure within the past 6 months, or had reported congenital anomalies of the cervical spine or upper extremity such as Duchenne muscular dystrophy (DMD) or Erb's palsy (4, 11).

RESULTS

During the study period, a total of 370 individuals from the general population of Jalal Pur Jattan city were surveyed to assess cervical and upper extremity discomfort as well as functional limitation related to repetitive head loading.

DEMOGRAPHIC CHARACTERISTICS

The age distribution of the 370 participants included in the study is illustrated in Fig. 1. The age of the participants ranged from 22 to 35 years, with a mean age of 28.31 ± 3.24 years. The majority of participants were concentrated in the age range of 25 to 32 years, indicating that the study population consisted predominantly of young to early middle-aged adult construction laborers actively engaged in repetitive head loading activities.

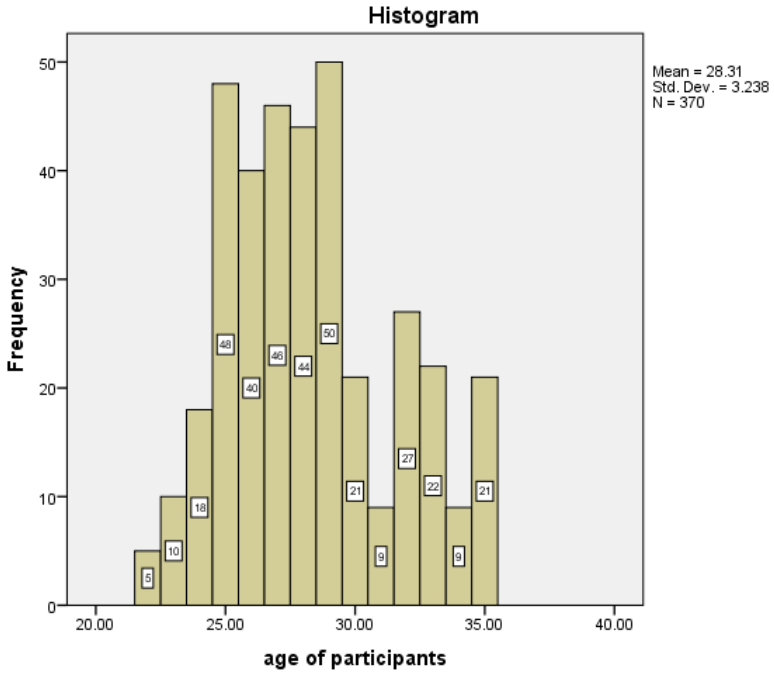

Fig. 1. Age distribution of participants (n=370). The mean age of the study participants was 28.31 ± 3.24 years (range: 22-35 years)

The frequency distribution of demographic variables including age, height, weight, job period, and working hours has been presented in Table I. The mean height was 5.62 ± 0.27 feet, mean weight was 67.47 ± 7.07 kg, mean job period was 6.85 ± 2.53 years, and mean working hours were 47.52 ± 2.52 hours per week.

Table I. Frequency distribution of demographic variables (n=370)

Sr.	Variable	Mean	Std. Deviation	Minimum	Maximum
1	Age (years)	28.31	3.24	22.00	35.00
2	Height (feet)	5.62	0.27	5.00	6.20
3	Weight (kg)	67.47	7.07	50.00	78.00
4	Job period (years)	6.85	2.53	2.00	15.00
5	Working hours (hours/week)	47.52	2.52	36.00	48.00

CERVICAL AND UPPER EXTREMITY DISCOMFORT

NECK DISCOMFORT

Regarding neck-related symptoms, 214 (57.8%) participants reported having trouble (ache, pain, discomfort, or numbness) in the neck during the last 12 months. Among these, 214 (57.8%) were prevented from performing their normal work activities due to neck trouble. Additionally, 147 (39.7%) participants experienced neck trouble within the last 7 days.

SHOULDER DISCOMFORT

With respect to shoulder symptoms, 149 (40.3%) participants reported no shoulder trouble during the last 12 months, while 77 (20.8%) reported right shoulder involvement, 58 (15.7%) reported left shoulder involvement, and 86 (23.2%) reported bilateral shoulder involvement. A total of 217 (58.6%) participants were prevented from performing normal work due to shoulder trouble, and 130 (35.1%) experienced shoulder symptoms within the last 7 days.

ELBOW DISCOMFORT

Regarding elbow symptoms, 178 (48.1%) participants reported no elbow trouble during the last 12 months. Among those affected, 73 (19.7%) reported right elbow involvement, 64 (17.3%) reported left elbow involvement, and 55 (14.5%) reported bilateral elbow involvement. Additionally, 186 (50.3%) participants were prevented from normal work due to elbow trouble, and 112 (30.3%) experienced elbow symptoms within the last 7 days.

WRIST/HAND DISCOMFORT

Concerning wrist and hand symptoms, 241 (65.1%) participants reported no trouble during the last 12 months. Among those affected, 47 (12.7%) reported right wrist/hand involvement, 35 (9.5%) reported left wrist/hand involvement, and 47 (12.7%) reported bilateral involvement. A total of 129 (34.9%) participants were prevented from normal work due to wrist/hand trouble, and 74 (20.0%) experienced symptoms within the last 7 days.

UPPER BACK DISCOMFORT

Regarding upper back symptoms, 218 (58.9%) participants reported having trouble during the last 12 months. Among these, 217 (58.6%) were prevented from performing normal work due to upper back trouble, and 127 (34.1%) experienced upper back symptoms within the last 7 days.

Table II presents the frequency distribution of cervical and upper extremity discomfort among construction laborers.

Table II. Frequency distribution of cervical and upper extremity discomfort (n=370)

Variables	Response	n (%)
Have you at any time during the last 12months had trouble (ache, pain, discomfort, numbness) in neck	No	156 (42.2)
	Yes	214 (57.8)
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? in neck	Yes	214 (57.8)
	Not Applicable	156 ((42.2)
	No	68 (18.4)
Have you had trouble at any time during the last 7 days in neck?	Yes	147 (39.7)
	Not Applicable	155 (41.9)
Have you at any time during the last 12 months had trouble (ache, pain, discomfort, numbness) in shoulders	No	149 (40.3)
	Yes, Right shoulder	77 (20.8)
	Yes, left shoulder	58 (15.7)
	Yes, both shoulders	86 (23.2)
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? in shoulders	Yes	217 (58.6)
	Not Applicable	153 (41.4)
Have you had trouble at the time during the last 7 days in shoulders?	No	87 (23.5)
	Yes	130 (35.1)
	Not Applicable	153 (41.4)
Have you at any time during the last 12months had trouble (ache, pain, discomfort, numbness) in elbows	No	178 (48.1)
	Yes right elbow	73 (19.7)
	Yes, left elbow	64 (17.3)
	Yes, both elbows	55 (14.5)
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? in elbows	No	3 (0.8)
	Yes	186 (50.3)
	Not applicable	181 (48.9)
Have you had trouble at the time during the last 7 days? in elbows	No	78 (21.1)
	Yes	112 (30.3)
	Not applicable	180 (48.6)
Have you at any time during the last 12months had trouble (ache, pain, discomfort, numbness) in wrist/hands	No	241 (65.1)
	Yes, right wrist/hands	47 (12.7)
	Yes, left wrist/hands	35 (9.5)
	Yes, both wrist hands	47 (12.7)
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? in wrist/hands	Yes	129 (34.9)
	Not applicable	241 (65.1)
Have you had trouble at the time during the last 7 days? In wrist/hands	No	56 (15.1)
	Yes	74 (20.0)
	Not applicable	240 (64.9)
Have you at any time during the last 12months had trouble (ache, pain, discomfort, numbness) in upper back	No	152 (41.1)
	Yes	218 (58.9)
Have you at any time during the last 12 months been	No	1 (0.3)

prevented from doing your normal work (at home or away from home) because of the trouble? in upper back	Yes	217 (58.6)
	Not applicable	152 (41.1)
Have you had trouble at the time during the last 7 days? In upper back	No	92 (25.9)
	Yes	127 (34.1)
	Not applicable	151 (40.8)

The findings revealed that neck and upper back discomfort were the most prevalent complaints among construction laborers engaged in repetitive head loading, affecting 57.8% and 58.9% of participants, respectively. Shoulder discomfort affected 59.7% of participants (combining right, left, and bilateral involvement), while elbow and wrist/hand discomfort affected 51.9% and 34.9% of participants, respectively. Notably, a substantial proportion of affected individuals reported activity limitation and work prevention due to their musculoskeletal symptoms.

DISCUSSION

This study was conducted among construction laborers in Jalal Pur Jattan City, Punjab, Pakistan, to determine the prevalence of cervical and upper extremity discomfort and functional limitation related to repetitive head loading.

A total of 370 participants who engaged in lifting heavy objects on their heads were enrolled using a non-probability convenient sampling technique. The Nordic Musculoskeletal Questionnaire was used to assess cervical pain, upper extremity discomfort, and functional limitation in the study population. The mean age of participants was 28.31 ± 3.24 years, mean height was 5.62 ± 0.27 feet, mean weight was 67.47 ± 7.07 kg, mean job period was 6.85 ± 2.53 years, and mean working hours were 47.52 ± 2.52 hours per week.

The frequency and percentage of musculoskeletal complaints were calculated for various body regions. Regarding neck symptoms, 57.8% of participants reported neck pain during the last 12 months, and 39.7% experienced neck trouble within the last 7 days. For shoulder symptoms, 20.8% reported right shoulder pain, 15.7% left shoulder pain, and 23.2% bilateral shoulder pain during the last 12 months, while 35.1% experienced shoulder pain within the last 7 days. Regarding elbow symptoms, 19.7% reported right elbow pain, 17.3% left elbow pain, and 14.5% bilateral elbow pain during the last 12 months, with 30.3% experiencing elbow pain within the last 7 days. For wrist and hand symptoms, 12.7% reported right wrist/hand pain, 9.5% left wrist/hand pain, and 12.7% bilateral wrist/hand pain during the last 12 months, while 20.0% experienced symptoms within the last 7 days. Regarding upper back symptoms, 58.9% reported upper back pain during the last 12 months, and 34.1% experienced upper back pain within the last 7 days.

The current study discovered that construction workers had a significantly high prevalence of cervical and upper extremity musculoskeletal complaints, with a considerable average number of painful body segments. These complaints are frequently experienced by workers in the building construction industry, and the prevalence has been shown to increase with prolonged work duration in this field (1).

Musculoskeletal disorders are common among construction workers and can begin at a young age. The majority of apprentice construction workers reported having at least one MSD symptom in at least one of nine anatomical regions during the previous year. Upper-extremity musculoskeletal disorders (neck, shoulder, and arm pain) were substantially more common among construction workers. Due to the increasing population dependence on this profession, reports of MSDs among workers have been documented predominantly in Asian nations, including Pakistan (62%), India (50%), Iran (33.3%), Thailand (10%), and Indonesia (3.3%). In Pakistan, the labor sector employs more than 7.6 million people, making it the second-largest employer in the nation (12).

The Nordic Musculoskeletal Questionnaire (NMQ) was the most frequently employed instrument for assessing musculoskeletal symptoms in study populations. The NMQ was utilized in 76% of the included studies to analyze employees' musculoskeletal complaints. The questionnaire was designed as a sensitive, rapid screening tool for evaluating musculoskeletal complaints across various body regions (13).

The workforce represents the primary population affected by MSDs due to heavy workload and challenging working conditions. According to survey data, upper back disorders (83.74%), neck and

shoulder disorders (78.01%), and combined disorders (75.78%) were the most common MSD locations, demonstrating the severity of MSDs among workers (14).

Previous research has shown that the prevalence of MSDs increases with age and the number of working years. Long-term high-load conditions imposed on the construction worker's musculoskeletal system, which cannot be adequately relieved, result in neck pain, upper back pain, and other musculoskeletal discomfort. Furthermore, due to intense workload, irregular rest periods, and inability to receive timely treatment for illnesses, workers' work habits and productivity deteriorate over time (15).

Another study demonstrated that cervical pain, upper extremity discomfort, and functional limitation showed moderate to weak relationships between upper extremities and neck-related discomfort, headache frequency, neck pain frequency, and shoulder pain intensity. Additionally, the frequency and severity of pain may affect the ability to perform extension and lateral flexion. The prevalence of MSDs increases with age and the number of working years (16).

Researchers have concluded that due to the demands of their jobs, workers suffer from significant MSDs, and factors such as age, type of work, years of experience, education level, and marital status influence these conditions. Furthermore, MSDs adversely affect workers' ability to perform their jobs effectively. Appropriate measures should be implemented to help reduce the burden of MSDs and improve the working environment (17).

According to recent studies, neck pain affects up to 60% of construction workers, with 22.3% reporting current cervical pain. Upper extremity involvement (26.5%) showed significantly higher prevalence among construction workers compared to other workers (13.2%). The upper back was identified as the most frequently affected body region. Poor posture significantly increases the likelihood of neck musculoskeletal disorders among individuals engaged in lifting heavy objects on their heads (18).

CONCLUSION

The study concluded that there is a high prevalence of cervical pain, upper extremity discomfort, and functional limitation among laborers who lift heavy objects on their heads. These musculoskeletal complaints are significantly associated with age and duration of working hours. Pain in the cervical spine and upper extremities limits the range of motion and poses a risk of functional impairment in affected individuals.

Limitations:

The current study has the following limitations:

1. The study was limited to Jalal Pur Jattan city only; therefore, the nationwide prevalence of cervical and upper extremity issues related to repetitive head loading could not be estimated.
2. A non-probability convenient sampling technique was employed, which may limit the generalizability of the findings.
3. The cross-sectional study design precludes the establishment of causal relationships between repetitive head loading and musculoskeletal symptoms.
4. Subjective assessment using a questionnaire may introduce recall bias among participants.
5. Objective measures of range of motion or muscle strength were not included in the assessment.

Conflict of interest:

Authors declared no conflict of interest.

Authors' contribution:

AZ Conception, design, data collection and manuscript writing; RK Supervision, critical revision and final approval; HA Data analysis, interpretation and manuscript review; MA Literature search and data acquisition.

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