

Musculoskeletal Pain and Associated Factors among Building Construction Workers in Southeastern Ethiopia

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Abstract

Background: Musculoskeletal disorder (MSD) is a major global occupational health problem, and employees in the construction industry have potential risk of it. Worldwide, the prevalence of musculoskeletal symptoms involving one or more body regions is higher in construction workers.

Objectives: This study aimed to investigate prevalence of musculoskeletal pain and associated factors among building construction workers.

Methodology: An institutional based cross sectional study was carried out among building construction employees in Goba town from April 01-30/2017. Structured and pre-tested questionnaire was used to select the study sample. Simple random sampling method was employed to select the study participants. The data was analyzed using SPSS version 20 computer software. Binary logistic regression and multivariable logistic regression analysis with 95% confidence interval (CI) were performed.

Result: The overall prevalence of musculoskeletal pain among building construction workers was 43.9% [95 % CI: (37.2, 49.3)] in the previous 12 months. Lower back (25.5%), wrist/ hands (16.9%), and upper back (15.7%) disorders were the three leading types of musculoskeletal disorders. Work category (AOR=3.71 for manual laborer and AOR=1.30 for masonry), and experience (AOR = 0.51) were identified as risk factors of musculoskeletal pain.

Conclusion: In this study the prevalence of musculoskeletal pain among building construction workers is high. Being manual laborer and masonry, and working more than 5 years in the construction work will raise the odds of musculoskeletal pain.

Keywords: Musculoskeletal Pain; Lower Back Pain; Manual Workers; Construction Safety and Health

Abbreviations: CI: Confidence Interval; COR: Crude Odds Ratio; ILO: International Labor Organization; IRB: Institutional Review Board; LBP: Lower Back Pain; WRMSDs: Work Related Musculoskeletal Disorders.

Background

Musculoskeletal disorder (MSD) is a major global occupational health and safety problem, and employees working in the construction company have potential risk of it [1-3]. Worldwide, the prevalence of musculoskeletal symptoms involving one or more body regions is higher in construction workers [4]. The load of physical work associated with awkward prolonged working postures and manual handling of materials by the construction workers can cause various musculoskeletal pains and disorders [5]. Work related musculoskeletal disorders (WRMSDs) are injuries and disorders of the soft tissues such as muscles, tendons, ligament, joints, and cartilage that can affect nearly all tissues including the nerves and tendons that involve neck, shoulders, backs, arms, and legs [6]. Most WRMSDs are chronic disorders which can develop over time. They can be episodic or chronic in duration and can also result from injury sustained in a work-related accident. Additionally, they can progress from mild to severe disorders through time. These disorders are seldom life threatening but they impair the quality of life of a large proportion of the adult population in the world [7].

Lower back pain (LBP) is one of the commonest and most prevalent forms of musculoskeletal disorders which cause disability and work absenteeism in the developed nations. LBP is considered as one of the leading causes of disability, inability to work, work absenteeism, financial costs and loss of quality of life [8-10]. Approximately from 60% to 90% of people will suffer from low back pain at some point in their life. Many of the factors causing LBP can be associated with a job. Globally, about 37% of LBP can be attributed to work [11]. Three different groups of potential risk factors have been identified: (a) individual factors such as age, height, body weight and smoking (b) physical factors such as heavy lifting, rapid work pace, repetitive motion patterns, insufficient recovery time, twisted postures, awkward and vibration (both segmental and whole-body), contact stress, and extreme temperature (c) psychosocial factors such as psychological demands and mental workload, organizational and job dissatisfaction [12,13].

In Great Britain, about 6.6 million working days were lost due to WRMSDs, where work related upper limb disorders (WRULDs) account for around 2.6 million of days lost, back disorders about 2.2 million and work related lower limb disorders (WRLLDs) 1.7 millions of days. An average of 14 days was lost for each case [7]. In the United States, the National Arthritis Data Workgroup reviewed national survey data showing that each year some 15% of adults report frequent back pain or pain lasting more than two weeks. In Canada, Finland and the United States, more people are disabled from working as a result of musculoskeletal disorders (MSDs) - especially back pain than from any other group of diseases [11]. In Jimma town, about forty percent of building construction workers was suffered from back pain, and in Robe town about 4% of construction workers injured due to lifting heavy load [14,15]. In Ethiopia, there is lack of data on work-related musculoskeletal pain in construction workers. This study aimed to identify prevalence of musculoskeletal pain and associated factors among building construction workers in southeast Ethiopia.

Methods

Study Design, Area and Period

An institutional based cross sectional study was carried out among building construction workers in Goba town from April 01-30/2017. Goba town is found in Bale Zone, Southeast of Ethiopia, located 445 km from Addis Ababa. The town has 7 construction industries; a total of 712 workers were involved during the study period. All construction projects were included in the study.

Sample Size Determination

The sample size will be determined using a single population proportion formula by taking an estimated 50% proportion ($p = 0.5$), 5% margin of error ($d = 0.05$) and 95% confidence interval ($Z = 1.96$) the sample size will be calculated to be 384. Finally, the total sample size for the study was adjusted by 10% to 422 to account for potential non-response rate.

Data Collection Process and Quality Management

A standardized questionnaire was adapted by reviewing different literatures based on the study objectives [5,14,16]. The questionnaire was developed in English and translated to local (Afaan Oromo) language

and retranslated to English language with independent language experts. Then face to face interview was conducted by using pre-tested and structured questioner.

Simple random sampling technique was employed to select the required sample from each construction site. The required sample size was proportionally allocated to the number of workers for each construction industry. Then the required sample was selected by using the employees' payroll. Three 12 graduates and one environmental health profession who can speak Afaan Oromo language were recruited for data collector and supervisor respectively. Then data collectors and supervisors were trained two days about the questioner and how to administer it. The questionnaire was pre-tested on 5% of the sample before data collection to check consistency. During data collection, the supervisors supervise for its completeness on daily basis and feedback was given to each data collectors. The questionnaire included socio-demographic data, personal information, work related history, musculoskeletal pain in the previous 12 months, affected body parts, work absent seem due to the pain and treatment taken among construction workers in the previous one year were collected.

Data Analysis

All components of data were entered and cleaned, coded and analyzed using SPSS version 20 computer software. Frequency distributions, percentages, ranges, means and standard deviations were done using

descriptive statistics. Binary logistic regression and multivariable logistic regression analysis with 95% confidence interval (CI) was performed. In binary logistic regression variables with p -value ≤ 0.25 were selected for multivariable logistic regression model to control cofounders. All variables p -value < 0.05 in multivariable logistic regression analysis were taken as significance.

Ethical Considerations

Ethical clearance letter was obtained from Madda Walabu university ethical clearance committee. Support letter was taken for construction industries responsible persons and other concerned bodies in Oromia region, Goba town. Informed consent was obtained from each interviewee and they were also given the choice to refuse to participate in the study.

Results

Of the total 422 workers, 410 participated in the study yielding the response rate of 97.2%. The age of the respondents' range from 21–58 years with a mean age of 31.32 (7.54%) years. One thirds, 128(31.2%) of the employees were manual laborers. The majority 227(55.4%) have less than five years of experience. About seventy percent of the employees worked for more than 8 hours per day. Only 71(17.3%) have trained on ergonomics. One fourths 105(25.6%) were drink alcohol (Table 1).

Variables	Age (in years)
Mean (SD)	31.32 (7.54)
Range	21–58
Height (m)	
Mean (SD)	1.62 (0.08)
Range	1.49–1.85
Weight (kg)	
Mean (SD)	69.770 (14.08)
Range	45–92
BMI (kg/m²)	
Mean (SD)	27.06 (4.77)
Range	15.41–35.32
Educational level	
Illiterate	44(10.7)
Read and write	35(8.5)
Primary(1-8)	171(41.7)
Secondary and above	160(39)
Job category	
Manual laborer	128(31.2)
Masonry	105(25.5)
Plasterer	69(16.8)

Painter	50(12.2)
Carpenter	29(7.1)
Welder	18(4.4)
Driver/Operator	11(2.7)
Work experience	
<5 years	227(55.4)
>5 years	183(44.6)
Work hours per day	
<8 hours	124(30.2)
>8 hours	286(69.7)
Duration of break during work	
<20 minutes	129(31.5)
>20 minutes	281(68.5)
Job satisfaction	
Yes	146(35.6)
No	264(64.4)
Training on ergonomics	
Yes	71(17.3)
No	339(82.7)
Drink alcohol	
Yes	105(25.6)
No	305(74.4)
Smoke cigarette	
Yes	78(19.0)
No	332(81.0)

Table 1: Participants characteristics in Goba town, southeast Ethiopia.

Characteristics and Consequences of Musculoskeletal Pain

The overall prevalence of musculoskeletal disorder in building construction workers was 43.9% [95 % CI: (37.2, 49.3)] in the previous 12 months, where lower back (25.5%), wrist/ hands (16.9%), and upper back (15.7%)

were the most frequently affected body parts. Dull aching (42.8%) followed by cramping (35.6%) was the most prevalent type of pain. The average duration of pain was 1–2 weeks in 35.6% workers. About 51.7% construction workers took more than 15 days sick leave over last 12 months (Table 2).

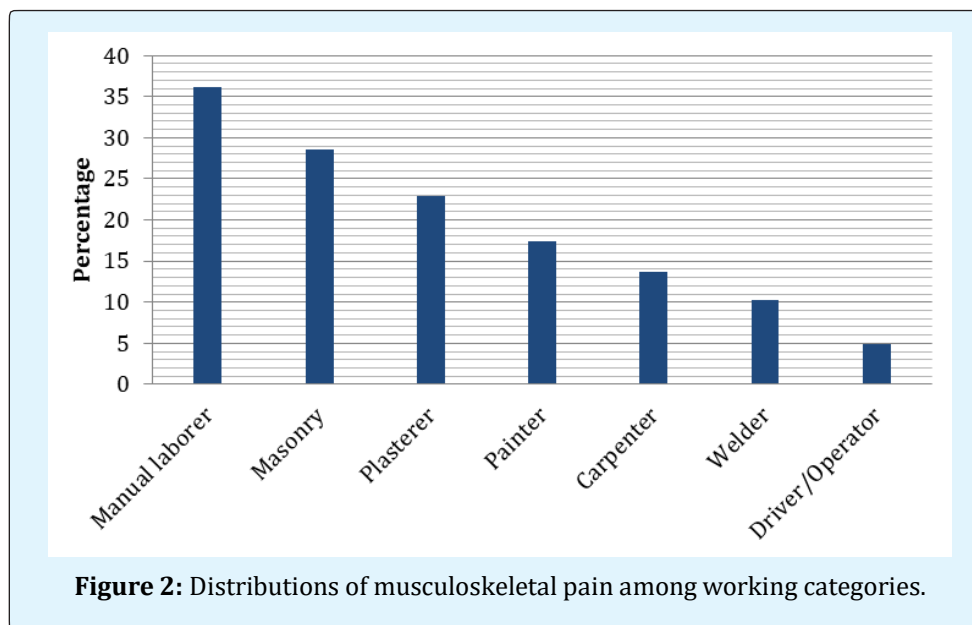
Variables	Number (%)
Location of Musculoskeletal Pain	
Neck	14(7.6)
Elbow	10(5.7)
Shoulder	19(10.5)
Wrist/Hand	30(16.9)
Upper back	28(15.5)
Lower back	46(25.5)
Hip/Thigh	6(3.3)
Knee	16(8.9)
Ankle/foot	11(6.1)
Time of Symptom	
During activities	92(51.1)
During rest	31(17.2)
At sleep	57(31.7)
Frequency of Pain	

Occasional	89(49.4)
Often	71(39.4)
Sometimes	16(8.9)
Always	4(2.3)
Type of Pain	
Cramping	64(35.6)
Dull aching	77(42.8)
Shooting	28(15.5)
Burning	9(5.0)
Others	2(1.1)
Duration of Pain	
< 2 hours	17(9.4)
>2 hours	29(16.1)
2-6 days	47(26.1)
1-2 weeks	64(35.6)
>2 weeks	23(12.8)
Sick Leave	
Nil	75(41.7)
<15 days	12(6.6)
>15 days	93(51.7)
Treatment Taken	
Medical	101(56.1)
Physiotherapy	74(41.1)
Others	5(2.8)

Table 2: Characteristics and consequences of musculoskeletal pain in building construction workers in Goba town, southeast Ethiopia.

Distributions of Musculoskeletal Pain by Working Category

In this study, manual laborer (36.1%) followed by masonry (28.6%) workers were the most highly affected Occupational groups (Figure 2).



Factors Associated Musculoskeletal Pain

This study revealed that musculoskeletal pain prevalence was 43.9% [95 % CI: (37.2, 49.3)]. Work category (manual laborer: AOR=3.71 and masonry:

AOR=1.30), and experience (AOR = 0.51) were significantly associated with musculoskeletal pain in multivariable logistic regression (Table 3).

Variables	Musculoskeletal Pain		OR(95% C.I)	
	Yes	No	COR, (95% C.I)	AOR, (95% C.I)
Work category				
Manual laborer	89	39	3.29(1.06,7.55)	3.71(1.02,7.67)
Masonry	64	41	4.96(2.48,10.73)	1.30(1.06,10.28)
Plasterer	11	58	1.91(1.00,4.95)	2.73(0.39,4.55)
Painter	7	43	2.55(0.64,5.79)	2.09(1.00,5.09)
Carpenter	4	23	11.98(0.71,22.92)	10.44(0.45,13.39)
Welder	2	16	1.84(0.17,7.35)	2.09(0.37,6.74)
Driver/Operator	3	8	1	1
Work experience				
<5 years	81	146	0.52(0.05,0.79)	0.51(0.01,0.97)
>5 years	99	84	1	1

Table 3: Factors associated with work-related musculoskeletal pain, using multivariable logistic regression model, Goba town, southeast Ethiopia.

AOR: Adjusted for age, height, weight, body mass index, educational level, duration of break during work, training on ergonomics, work hours per day, cigarette smoking, alcohol drinking and job satisfaction.

Discussion

The overall prevalence of musculoskeletal disorder in building construction workers was 43.9% in the previous 12 months. This finding was comparable with a study conducted in Saud Arabia, and lower than a study conducted in Malaysia and Taiwan [16,17]. This study was also greater than a study conducted in Great Britain [7]. This variation may be due to a difference between countries in work organizations and workers behavior on safety practice.

In this study lower back, wrist/ hands, and upper back disorders were the three leading types of musculoskeletal disorders. Comparable findings were reported from different countries: In Germen a cohort study reported 30.9% of LBP(13). A study conducted in Malaysia declared lower back (45%), followed by shoulder (28.3%), neck (16.7%), and wrist / hand (15%), upper back (13.3%), knees (13.3%), elbow (10%), hip/thigh (8.3%) and ankles or feet (5%) [17]. A case study among Iranian steel bar bending employees showed 59% of workers have suffered in their wrists/hands, and 46% had low back trouble [18]. A study among male manual construction workers in South Africa reported 25% of low back pain [19]. In Ethiopia 35.6% of construction workers were suffered from low back pain [14].

Manual laborer and masonry workers were the most affected working groups. This finding was comparable with a study in Great Britain, Malaysia and Ethiopia [15-17].

Work category and experience were significantly associated with musculoskeletal pain. Manual laborer and masonry worker were more likely affected with musculoskeletal disorder compared with the drivers or machine operators. The study conducted Jakarta indicated an association between manual handling practice and musculoskeletal disorders specially LBP [8]. It can be concluded that manual handling in construction industries have a significant level of higher physical stress associated with the jobs [20]. In Ethiopia 39.6% of manual laborers and 17.0% masonry workers were affected with low back [14]. Workers who have less than 5 years' experience were less likely develop the pain compared with their counterparts(AOR = 0.51). Work related musculoskeletal disorders was about 4 times more among workers with greater than 20 years of work experience than those with 11-20 years and are about 2 times more in those with 1-10 years of work experience respectively. Working in the same position for long periods, manual lifting of heavy loads were the most perceived job risk factors among India construction workers [5]. Our finding was also similar with a study conducted in Saudi Arabia reported that workers with greater than 5 years' experience were more likely affected with

musculoskeletal pain compared with those who have less than 5 years of experience[16].

Conclusion

In this study the prevalence of musculoskeletal pain among building construction workers is high compared with another study conducted in Ethiopia. Work category and experience were factors significantly associated with musculoskeletal pain.

Declaration

The study was performed by interviewing the construction workers after an ethical approval was obtained from IRB of the College of Health Sciences and individual verbal consent is obtained from the study participants. This manuscript has never been submitted and considered for publication to any other journal.

Availability of Supporting Data

Data will be available upon request.

Competing Interests

Authors have no competing interest and all have approved the manuscript for publication.

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Authors' Contributions

All authors have equal contribution on this manuscript. All authors read and approved the final manuscript.

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