

Research Article

Prevalence of Work Related Musculoskeletal Disorders and Associated Factors Among Coffee Processing Factory Workers in Addis Ababa and Gelan City in Ethiopia, 2023

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Abstract

Background: Globally, work-related musculoskeletal disorders (WRMSDs) account for around 40% of the total compensated cost of occupational diseases and injuries. It has a huge impact on the public health problems and economic loss of the society. There was few information about prevalence and risk factors for musculoskeletal diseases associated with job among coffee processors in Ethiopia. **Objective:** The study aimed to assess the prevalence and associated factors of work-related musculoskeletal disorders among coffee processing factory workers. **Methods:** A cross-sectional study was utilized to assess the prevalence of work-related musculoskeletal disorders from March to June-2023. Data were collected by face-to-face interview using a standardized Nordic questionnaire. Simple random sampling method was used to select 633 of study participants. EPIInfo version 7.1 was used to enter and cleaned up the data and exported into SPSS version 23 software for further statistical analysis. Bivariable and multivariable logistic regression analysis were used to determine potential predictors of MSDs. **Results:** The prevalence of work-related musculoskeletal disorders over the course of a year was 529 (83.6%). The limbs (64.5%) and shoulders (64.5%) were most commonly affected, followed by the neck (61.8%), upper back (60.2%), lower back (54.0%), and hands (51.2%). The final multivariate logistic regression analysis revealed that male [AOR: 1.8, 95%CI: 1.1, 2.9], married [AOR: 2.2, 95%CI: 1.3, 3.8], physical activity habit [AOR: 2.2, 95%CI: 1.1, 4.2], work-related stress [AOR: 2.0, 95%CI: 1.3, 3.4], health and safety training [AOR: 2.6, 95%CI: 1.1, 5.9], working hours [AOR: 3.0, 95%CI: 1.2, 7.5] and repetitive work [AOR: 2.0, 95%CI: 1.1, 3.5] were found to be statistically significant associating factors with work-related musculoskeletal disorders. **Conclusion:** In this study the prevalence of work related musculoskeletal disorder was high. Sex, marital status, habit of doing physical exercise, job related stress, work hours, health and safety training work place were statistically significant factors to work related musculoskeletal disorder.

Keywords

Coffee Processing Worker, Work Related Musculoskeletal Disorders, Ethiopia

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1. Introduction

Musculoskeletal disorders" (MSDs) refers to injuries and conditions which affect the musculoskeletal system or the movement of the human body. Pain or functional impairment resulting from various inflammatory, degenerative, and painful illnesses is referred to as work-related musculoskeletal disorders (WRMSDs) [1, 2]. Globally, 1.71 billion individuals live with musculoskeletal diseases, including low back pain, neck discomfort, fractures, various injuries, osteoarthritis, amputation, and rheumatoid arthritis, according to a recent review of data from the Global Burden of Disease (GBD) 2019 report [3]. People of all ages are affected worldwide, while the prevalence of musculoskeletal diseases varies by age and diagnosis. In terms of population, high-income nations (441 million) are the most afflicted, followed by the WHO Western Pacific Region (427 million) and the South-East Asia Region (369 million). With over 149 million YLDs, or 17% of all YLDs worldwide, musculoskeletal diseases are also the main cause of years lived with disability (YLDs) [3].

Worldwide, the prevalence of musculoskeletal illnesses associated to the workplace is rising. Such conditions have a significant financial impact on the world's population and

can negatively impact one's health, quality of life, and status [4]. Globally, work-related musculoskeletal disorders (WRMSDs) account for around 40% of the total compensated cost of occupational diseases and injuries. It has a huge impact on the public health problems and economic loss of the society [5]. WRMSDs cost the economy 6.9 million working days on average per case, with 498,000 cases of the work-related musculoskeletal disease out of 1,354,000 cases of work-related illness [6]. Because of the long duration of job impairment and reduced productivity, it has an economic effect.

The majority of musculoskeletal disorders are caused by low back pain, which accounts for 7.4% of all young life deaths globally and 570 million prevalent instances worldwide [3]. According to the International Labor Organization (ILO), 2.34 million people die each year from diseases or accidents related to their jobs, and 317 million experience work-related injuries [7, 8]. This condition results in long-term occupational impairment and decreased production. Musculoskeletal complaints typically lower quality of life, and illnesses require expensive medical care [9].

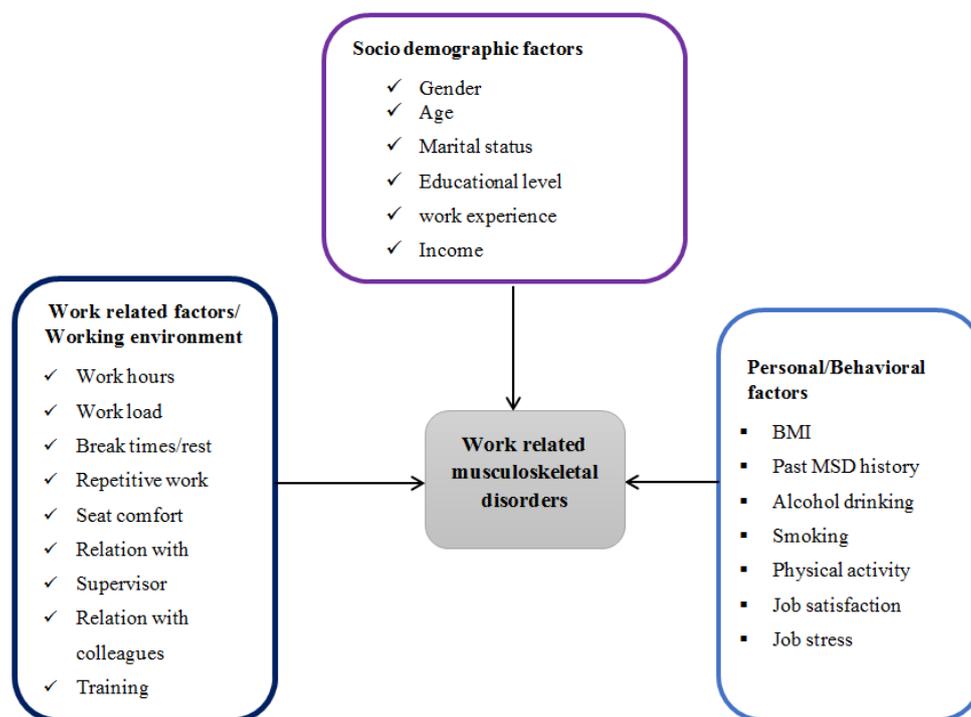


Figure 1. Conceptual framework for musculoskeletal disorders and related factors has been refined and incorporated from various research reviews.

In Ethiopia, the manufacturing sector and working areas are growing alarmingly. As a result, the problem of severe injury becomes a common problem due to the lack of a healthy working environment in the rate of industrial expansion.

Additionally, just 5–10% of Ethiopia's workforce has access to skilled workers and work-related health services, and there are little or no job-related services and psychosocial stress are Exist [10]. The labor-intensive nature of the

coffee industry increases the risk of WRMSD because most tasks require exerting effort, repeating motions, and maintaining a still posture for extended periods of time [11]. Coffee processing workers may be subjected to poor working conditions and physically demanding jobs include lifting large goods, bending, pushing, and dragging heavy loads, repeating the same actions, or adopting awkward postures. Workplace risk factors are likely to contribute to the development of WMSD, coupled with health status/personal restrictions and psychological factors including stress (US Department of Health and Human Services) [11]. Missed work days, financial losses from medical expenses, and poor working conditions owing to discomfort at work are all significant losses brought on by MSDs. MSDs are among the most common causes of decreased productivity at work due to absenteeism, sick leave, and early retirement [12].

Many studies in the textile and other industries have been conducted on workplace exposure, including occupational diseases and injuries. However, there have been few studies that have examined the prevalence of musculoskeletal disorders and focused on particular working groups and body regions. Therefore, this study assess the prevalence of musculoskeletal disorders in coffee processing workers and nine body regions to examine prevalence variation within body regions. In order to create effective methods to prevent and control musculoskeletal illnesses and disability, it is im-

portant to understand the factors that affect the prevalence of musculoskeletal disorders among coffee processing employees (figure 1).

2. Methods

2.1. Study Design, Period and Setting

A cross-sectional was used. This study was conducted in selected five coffee processing industries (three from Addis Ababa City and two from Gelan City), from March to June, 2023. There are 54 coffee processing industries in Addis Ababa City based on the evidence obtained from the city administration, and 10 in Gelan city which is a sub city of Shegar city. Gelan is one of the industrial zones in Oromia regional state, which is located southeast direction of 25 km far from Addis Ababa, the capital city of Ethiopia and contains 10 coffee processing industries. According to the Sub city administration, most of the foreigners and domestic investors are investing in different industrial activities. Among these industrial activities, the coffee processing factories are the common industries in the city. So based on the study objective five coffee processing industries were selected (figure 2).

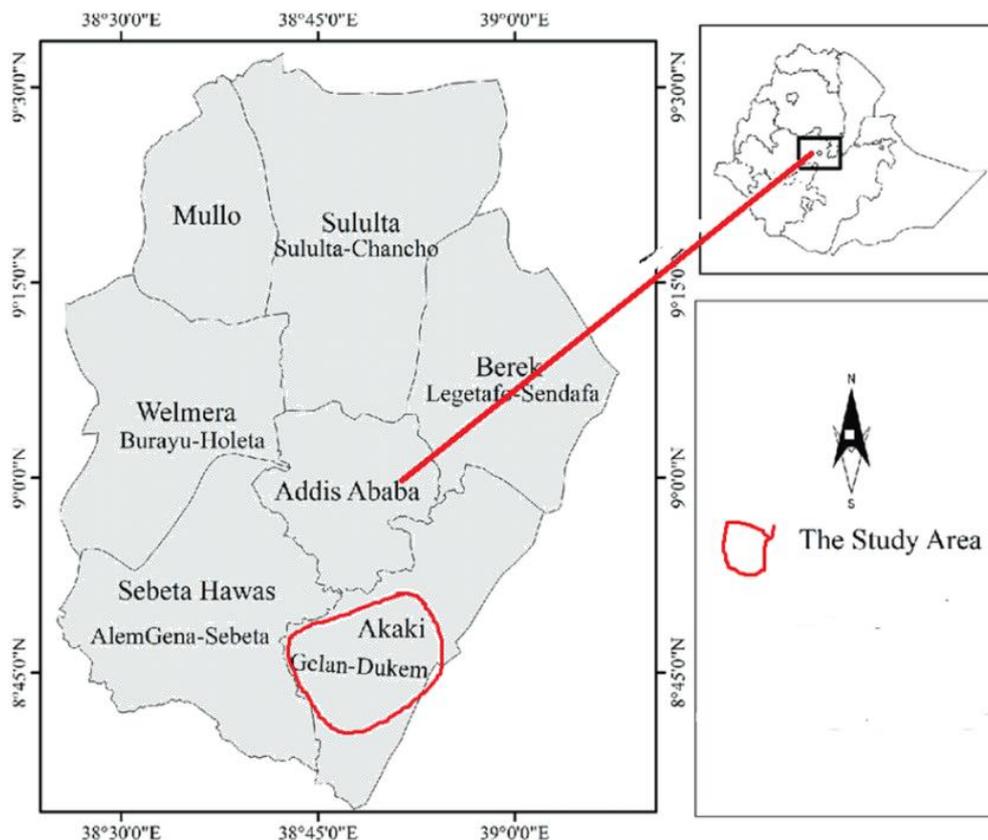


Figure 2. Maps of study area.

2.2. Population

All coffee processing factory workers in Addis Ababa city and Gelan city were source of population. All coffee processing factory workers in selected coffee processing factory were the study population.

2.3. Eligibility Criteria

Workers who have worked at least one year in coffee processing factory. Workers who are absent from work during the time of data collection were excluded from the study.

2.4. Study Variables

2.4.1. Dependent Variable

Work related musculoskeletal disorders. (Yes /No)

2.4.2. Independent Variable

Socio-demographic variables: Gender, age, sex, marital status, educational status, income and service year.

Work Environment factors: - Relation with Supervisor, working hours, total break excluding lunch time, health and safety training, repetitive work within less than 30 second/within few hours, loaded work, and fitness of working machine with sitting chairs.

Behavioral and Personal factors – Body mass index, physical exercise, smoking behavior, alcohol drinking, and

medical history with MSDs.

Psychosocial factors: - job satisfaction and job stress.

2.5. Sample Size Determination and Sampling Techniques

The sample size was calculated using a single population proportion formula, with the following assumptions: 5% margin of error (d), proportion (p) of WRMSDs among coffee processing workers 50% (due to lack of previous studies with similar working condition) and $Z_{\alpha/2}$ =the value of the standard normal curve score corresponding to the given CI. Accordingly, based on a single population proportion formula:

$$n = \frac{(z_{\alpha/2})^2 p(1-p)}{d^2} = \frac{(1.96)^2 0.5(1-0.5)}{(0.05)^2} = 384$$

After adding 10% for non-response rate, total sample size was 422. By considering 1.5 design effect the final sample size would be 633 of factory workers.

Multistage sampling was done. Stage one selection of factories from Addis Ababa and Gelan sub-city, secondly the working departments were selected. The sample size was proportionally allocated to three departments namely hand picker, transporter and operator. Workers' registrations used as the sampling frame. Finally, the numbers of representation of study participants were drawn by using lottery method from a list of their payment sheets (Table 1, figure 3).

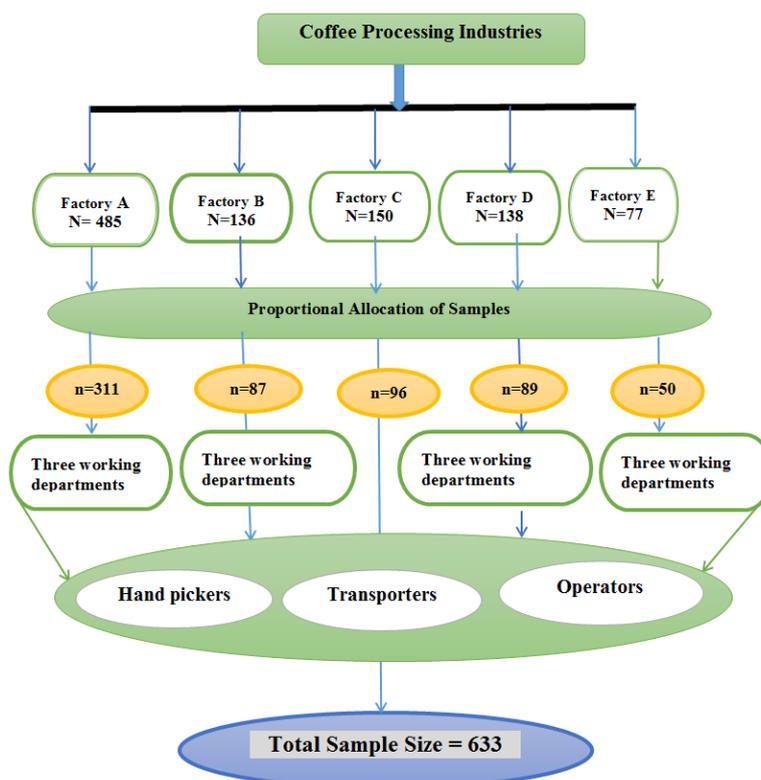


Figure 3. Schematic Representation of Sampling technique Coffee Processing Industry Workers, 2023.

Table 1. Sample size calculation based on their departments in five coffee processing industries in Addis Ababa and Gelan city in Ethiopia, 2023.

Working department	Factory A		Factory B		Factory C		Factory D		Factory E	
	Source	Sample								
Hand Picker	55	35	14	9	105	67	35	22	16	11
Transporter	350	225	102	65	40	26	99	64	55	35
Operator	80	51	20	13	5	3	4	3	6	4
Total	485	311	136	87	150	96	138	89	77	50

2.6. Data Collection Tools and Procedures

Face-to-face interview questionnaire was used to collect data by using a standardized Nordic questionnaire for assessing the prevalence of work-related musculoskeletal disorders in different body regions. Nordic questionnaire is repeatable, sensitive, and useful as a screening and surveillance tool for musculoskeletal disorders. Responses to any of the questions are either a “Yes” or a “No” [13]. It also assesses the associated factors, which includes socio-demographic characteristics, work related and behavioral factors [14]. The other contents of the questionnaire were developed from previous literature. The interviews carried out by using trained data collectors. During data collection, observation check list also used additionally to assess occupational health and safety in coffee processing areas such as any department or part of the department overcrowded and not free movement, work surfaces kept dry and slip-resistant, availability of health and safety committee, sign of warning and safety rule, existence of first aid equipment, training of workers, fire extinguishers, supervision of work place by safety professionals, method of loading unloading activities within the working site, presence of health and safety officer were condition of work environment assessed using observation check list.

2.7. Terms and Operational Definitions

Body segments: It includes neck, shoulder, upper back, lower back, hip /thigh, knee/leg, ankle/foot, and wrist /hand of the body [15].

Work related musculoskeletal disorders: Coffee processing workers who have experienced pain, ache or discomfort for at least 2-3 work days of the last 12 months in any part of body segments (neck, shoulder, upper back, lower back, hip /thigh, knee/leg and ankle/foot and wrist/hand or at least shown on one of the body parts caused, aggravated by work place exposures [16].

Repetitive work within greater than 30 second- Perform work by repeating the same activity with less than 30s or no

variation every few seconds for 2 or more hours [17].

Doing high loaded work: attaining forceful carrying above the shoulder, lifting and lowering loads, pushing and pulling heavy coffee sack (bag) weight greater than or equal to 60 kg as reported by workers and supervisors.

Workers job satisfaction: was assessed using a Likert scale to identify the level of satisfaction on their work. The option was 5 Likert scale (1-very dissatisfied, 2- dissatisfied, 3-neutral, 4- satisfied and 5 -very satisfied) with ten items. This part was computed according to Macdonald work place job satisfaction scale. The workers classified in to two categories by using demarcation threshold as satisfied (32-50) and not satisfied (10-31) [18].

Workers job stress: was assessed by using Marlin Company and the American Institute of Stress scale calculation. There was eight items which measure job stress with Likert scales (1-Never, 2- Rarely, 3- sometimes, 4- often, 5- always). The workers categorized in to two based on their scores, had stress (≤ 15) and no stress (16-40) [19].

2.8. Data Processing and Analysis

Throughout the data collection process, the primary investigator and supervisor reviewed the data every day to ensure it was comprehensive. Additionally, the gathered data was double-checked, revised, coded, and entered into EPIInfo version 7.1 before being exported to SPSS version 23.0 for additional analysis. There was descriptive analysis done using terms like frequency, percentage and cross-tabulation. By using binary logistic regression analysis, the relationship between the outcome variable (WRMSDs) and independent variables was investigated, and the crude odds ratio (COR) was calculated at a 95 percent confidence interval. Only variables with P-value < 0.2 from the bivariate analysis were included in the multivariate analysis to prevent an excessive number of variables and unstable estimates. After that, variables in the multivariate analysis with $P < 0.05$ were deemed significant and displayed using an adjusted odds ratio. Model fitting used the Hosmer and Lemeshow goodness of test to verify the results, which revealed $\chi^2 = 6.690$ with a degree of

freedom (DF = 8) and a significant value of 0.570. Because of this, the p-value was higher than the 0.05 normalized p-value. Given a p-value of 0.05, the Hosmer and Lemeshow test should be negligible, suggesting that the entered variable fits the model. Regression analysis's outcome has thus far indicated that the model is adequate and well-fitted to the predictors. Test of Collinearity verified by the Spearman rho test and Kendall's tau-b. All variables exhibited a correlation value less than 0.75. Which show that a certain independent variable in the model cannot be explained by another independent variable.

2.9. Data Quality Assurance

The survey was written in English, then independently translated into Amharic and Afan Oromo before being re-translated back into English to ensure uniformity. Five percent of the sample size in the Galan sub city participated in a pre-test to find possible issues with the questionnaire's modification and data collection instruments. Supervisors and data collectors received training on ethical concerns, questioning strategies, and every aspect of data gathering instruments. Throughout the period of data collection, a supervisor oversaw regular supervision and daily checks were made to ensure the consistency and completeness of the data.

2.10. Ethical Consideration

The Ethical Review Committee (REC) of the Addis Ababa University School of Public Health granted ethical clearance with approval numbers of (Ref. No. SPH/154/2023). A formal letter of collaboration was received from Addis Ababa University's College of Health Sciences, specifically from the School of Public Health. The industries involved in coffee processing were consulted for permission. After providing them with all the information they needed to understand the goal, advantages, and risks of the study as well as their ability to choose whether or not to participate, respected participants gave their oral consent. The participants of this study was productive age group (age greater than 18 years old) so, the oral consent was obtained directly from the participants. All the participants were reassured of the anonymity, and personal identifiers are not used. Then, after obtaining oral consent from every participant, the data collectors continue the job by giving due respect to the norms, values, beliefs, culture, and ensuring the confidentiality of the data they collect. The research findings will be utilized to develop strategies for the prevention and control mechanism of musculoskeletal disorders in the coffee processing industries, however the study participants were clearly informed that there is no direct financial benefit or risk associated with this research.

3. Results

3.1. Socio Demographic Characteristics of the Study Participants

The total number of participants was 633, with a 100% response rate. The average age of the participants was 31.04%, with a standard deviation (SD) of ± 8.46 . Of the participants, 484 (76.5%) was male and 531 (81%) were married. Of those surveyed, 230 (44%) had completed their secondary school, while just 6.6% were illiterate. Out of all the responders, 171 (27%) were under 30 years old. Based on the employment history of the participants, 507 (80.1%) had a tenure ranging from one to five years. The majority of responders 481 (76%) had monthly salaries of less than 5000 Ethiopian Birr (Table 2).

Table 2. Socio-Demographic characteristics of participants in the selected Coffee processing industries in Addis Ababa and Gelan city, Ethiopia, 2023.

Variables	Frequency (N= 633)	%
Gender		
Male	484	76.5
Female	149	23.5
Age (Years)		
Below 20	44	7
21 - 24	94	14.8
25 – 29	171	27
30 – 34	150	23.7
35 – 39	87	13.7
≥ 40	87	13.1
Educational level		
Illiterate	42	6.6
primary school	182	28.8
Secondary school	230	43.9
Certificate and above	100	15.8
Marital status		
Single	120	19
Married	513	81
Monthly Income		
≤ 5000 ETB	481	76
> 5000 ETB	152	24
Service Year		
1-5 years	505	79.8

Variables	Frequency (N= 633)	%
≥ 6 years	128	20.2

3.2. Individual and Behavioral Characteristics of Study Participants

Self-reported data from study participants shows that, based on WHO classification, 515 (81.4%) personnel have a normal weight body mass index (BMI) (18.5-24.9 kg/m²), 91 (14.4%) are overweight (25-29.9 kg/m²), and 27 (4.3%) are underweight. 137 employees, or 21.6% of the total, worked out at least twice a week at the five coffee manufacturing plants. Smoking habits were not disclosed by any of the study participants. On the other hand, 124 people (19.6%) claimed to drink alcohol for a variety of reasons at least twice a week. 89 respondents, or 14.1%, reported having been ill in the past. Out of all responders, just 121 (19.1%) are happy with their jobs. (Table 3).

Table 3. Behavioral characteristics of the study participants among coffee processing workers in Addis Ababa and Gelan City, Ethiopia 2023.

Variables	Frequency (n)	%
Body Mass Index (kg/m ²)		
Under weight (Below 18.5)	27	4.3
Normal (18.5 – 24.9)	515	81.4
Over weight (25.0 – 29.9)	91	14.4
Habit of doing physical exercise		
Yes	137	21.6
No	496	78.4
Drinking habit of the respondents		
Yes	124	19.6
No	509	80.4
Medical history of illness		
Yes	89	14.1
No	544	85.9
Supervisor relationship		
Good	194	30.6
Poor	439	69.4
Colleague relationship		
Good	472	74.6
Poor	161	25.4
Job stress		

Variables	Frequency (n)	%
16-40 (Yes)	494	78
≤ 15 (No)	139	22
Job Satisfaction		
32-40 (Yes)	121	19.1
10 – 31 (No)	512	80.9

3.3. Work-Related Environment and Ergonomic Characteristics of Study Participants

About 159 (25.1 percent) and 449 (70.9 percent) of the respondents said they occasionally and consistently worked at a high level, respectively. Of all the survey participants, 533 people (79.5%) had no training at all in subjects pertaining to occupational health and safety. A total of 376 respondents, or 59.4%, said they worked more than eight hours a day. A total of 423 individuals, or 66.8%, reported having breaks shorter than fifteen minutes, excluding lunch. Thirty-four (5.4%) of the sitting people claimed their seats were uncomfortable for sitting work, while fifty-nine (17.2%) said they worked six days a week. In the meantime, 446 respondents (70.5%) said they had spent more than two hours stuck in a bend (Table 4).

Table 4. Work-related environment and ergonomic characteristics of study participants among coffee processing workers in Addis Ababa and Gelan city in Ethiopia, 2023.

Variables	Frequency (n)	%
Doing high loaded work		
Never	25	3.9
Sometimes	159	25.1
Always	449	70.9
Attending on health and safety training		
Yes	130	20.5
No	503	79.5
Work in same position for two hours		
Yes	446	70.5
No	187	29.5
Total working hour per Day		
≤ 8 hrs.	257	40.6
>8 hrs.	376	59.4
Working days in sitting position per week		

Variables	Frequency (n)	%	Variables	Frequency (n)	%
6days	109	17.2	Seat comfort		
7days	35	5.5	Non-Comfort	34	5.4
Duration of break			Comfort	110	17.4
< 15 minutes	423	66.8			
≥ 15 minutes	210	32.2			
Repetitive work					
Yes	198	31.3			
No	435	68.7			

The overall prevalence of work-related musculoskeletal disorders among workers in coffee processing factories were 83.6%. From specific body segments shoulder (64.5%) was the most affected body parts whereas, hips the lowest affected body parts (16.5%) (figure 4).



Figure 4. The prevalence of work-related musculoskeletal disorders (WRMSDs) by body regions among workers in coffee processing factories in Addis Ababa and Gelan city in Ethiopia, 2023 (n=633).

3.4. Factors Associated with Work-Related Musculoskeletal Disorders

A total of twelve variables were chosen with a p-value less than 0.2 in order to be the candidate variables for the multi-variable analysis. Male respondents were 1.8 times more likely to acquire a WMSD than female respondents [AOR: 1.8, 95% CI: (1.1, 2.9)]. Married respondents were 2.2 times more likely to develop WMSD than single respondents [AOR: 2.2, 95% CI: 1.3, 3.8]. Participants who did not engage in regular physical activity had a 2.2 times higher risk of developing MSDs than those who did so at least twice a week for at least 30 minutes [AOR: 2.2, 95% CI: 1.1, 4.2].

Workers who experienced job-related stress were two times more likely to develop MSDs than those who did not [AOR: 2.0, 95% CI: 1.3, 3.4]. Respondents who had not participated in professional health and safety training were 2.6 times more likely to develop WMSD than those who had participated in health and safety training in the work environment [AOR: 2.6, 95% CI: 1.1, 5.9]. Participants who worked more than eight hours per day were three times more likely to develop WMSD than those who worked less than eight hours per day [AOR: 3.0, 95% CI: 1.2, 7.5]. Participants who performed repetitive work were twice as likely to develop WMSD as those who did not perform repetitive work [AOR: 2.0, 95% CI: 1.1, 3.5] (Table 5).

Table 5. Binary logistic regression of factors associated with WRMSD among Coffee Processing Factory Workers in Addis Ababa and Gelan city in Ethiopia, 2023.

Variables	WRMSDs (n=633)		COR (95% CI)	AOR (95% CI)
	Yes	No		
Sex				
Male	417	67	2.1 (1.3, 3.2)	1.8 (1.1, 2.9)*
Female	112	37		1
Marital Status	90			
Single	439	30	2.0 (1.2, 3.1)	1
Married	90	74		2.2 (1.3, 3.8)**
Medical history of illness				
Yes	81	8	2.2 (1.0, 4.6)	2.1 (0.9, 4.7)
No	448	96		1
Habit of doing physical exercise				
Yes	102	14	1.9 (1.1, 3.5)	1
No	427	90		2.2 (1.1, 4.2)**
Alcohol consumption				
Yes	114	10	2.6 (1.3, 5.1)	2.1 (0.9, 4.3)
No	415	94		1
Relation with supervisor				
Good	103	30	1.7 (1, 2.7)	1
Poor	426	74		0.8 (0.5, 1.3)
Job stress				
≤ 15 (No)	105	34	1.9 (1.2, 3.1)	1
16-40 (Yes)	424	70		2.0 (1.3, 3.4)**
Job Satisfaction				
10 – 31 (No)	436	76	1.7 (1.1, 2.8)	1.6 (0.9, 2.7)
32-40 (Yes)	93	28		1
Workplace health and safety				
Yes	82	41	2.4 (1.1, 5.4)	1
No	447	63		2.6 (1.1, 5.9)*
Working hours per day				
≤ 8 hrs.	20	9	2.4 (1.1, 5.5)	1
>8 hrs.	509	95		3.0 (1.2, 7.5)*
Duration of break				
< 15 minutes	344	79	1.75 (1.0, 3.0)	1.7 (0.9, 3.1)
≥ 15 minutes	185	25		1
Repetitive work				
Yes	378	55	1.7 (1.0, 2.9)	2.0 (1.1, 3.5)*

Variables	WRMSDs (n=633)		COR (95% CI)	AOR (95% CI)
	Yes	No		
No	151	49		1

*Significant association; significant at * $P \leq 0.05$, ** $P \leq 0.01$, and *** $P \leq 0.001$.

4. Discussion

In the current study, 83.6% [95%CI: 80.4, 86.4] of coffee processing factory workers reported having symptoms of work-related musculoskeletal disorders (WRMSDs) during the previous 12 months. This result is generally in line with previous research on workers in various industrial sectors, which included 84.6% of Nigerian plumbers [20], 81.6% of Chiang Rail, Thailand [4], 83.30% of Nigerian quarry workers [21], 77.2% of Ethiopian among academic staff [22], 80.40% of Cambodian fruit farm workers in Eastern Region, Thailand [9], and 77.1% of Ugandan sugar factory workers [23]. The shoulders (64.5%), neck (61.8%), upper back (60.2%), lower back (54.0%), and hands were the most often reported body parts with the highest incidence of discomfort (51.2%). Hip predominance, on the other hand, is lower than that of other body parts, at 16.4%. The result of this study findings were higher than the study in different part of Ethiopia with different working area [1, 10, 18, 22, 24]. This difference may be explained by responder features that result in pain in the upper and lower back, such as standing and extended sitting with a bent back. The different working area also contributed for the variation. Previous studies have demonstrated that extended periods of sitting without breaks result in firmness of the disk height at the 4 to 5 level, that bending the lumbar area may change the passive painfulness of the lumbar spine, or that the lower back predisposes the lumbar area to injury [22].

The study discovered that among the sociodemographic variables, marital status and gender were significant predictors of WRMSDs. The likelihood of developing musculoskeletal problems connected to employment was found to be roughly twice higher in male respondents compared to female respondents. This finding in line with research conducted on Cambodian Fruit Farm Workers in the Eastern Region of Thailand [9] and in the Oromia Regional State textile industries [25] found that male respondents were more likely than female respondents to acquire work-related stress disorders (WRMSDs). This might be explained by the fact that male workers typically perform physically taxing tasks such lifting, bending, reaching high, pushing, and towing large coffee sacks (bags) weighing more than or equivalent to 60 kg. However, among bank employees in Addis Ababa [1], musculoskeletal diseases related to their jobs and related factors indicated that female respondents had a higher proba-

bility of being female than male respondents. This disparity could be brought about by differences in the organizational and work environment settings.

In terms of marital status, respondents who were married were more likely than those who were single to be exposed to a work-related condition. The results of this study were consistent with those of a previous study [26, 27]. This could mean that married workers have to handle family tasks and a variety of social responsibilities on top of their professional obligations. Their heightened levels of social, psychological/mental, and physical stress, together with their dwindling chances of leisure time, raise their risk of developing WRMSDs.

Furthermore, the study discovered a strong correlation between WRMSDs and a few behavioral factors, such as exercise habits and job stress. Their risk of acquiring WRMSDs was increased by their lack of frequent exercise. Frequent exercise may improve muscle strength, aid in its maintenance, and shield it from damage when exposed to hazardous conditions. Exercise keeps muscles from getting tired by increasing body temperature, consuming more oxygen, accelerating metabolism, and boosting blood flow to tendons, muscles, and ligaments all of which support cellular nourishment. Without exercise, muscles become less flexible and more rigid, which increases their susceptibility to injury. This suggests that by promoting healthy blood vessel function, exercise minimizes vessel compression, fortifies muscles to withstand spasms, and lessens the discomfort brought on by illnesses [28].

A further important predictor of work-related musculoskeletal diseases was job stress. Workers with work-related stress were twice as likely to acquire work-related mental illnesses (WRMSDs) as workers without such stress. According to the findings of a study done among Hawassa's vehicle repair workers [18], among Bank staff in Jimma [24] and construction worker in Nigeria [29], psychological aspects are important in all types of MSDs. There is a strong correlation between stress-related symptoms and musculoskeletal disorders. In fact, a number of research suggest that the beginning of MSDs may be influenced by stress-related symptoms. Heavy workloads, little professional autonomy, and a lack of social support are commonplace for industrial workers, and these factors can contribute to high perceived stress levels. It is common for production line workers to employ equipment that aggravates musculoskeletal conditions [30, 31].

A few other important findings of this study included working hours per day, repetitive work, ergonomics, workplace health and safety training, and job-related environments. The risk of WMSD is increased by more than 2.6 times in the absence of workplace health and safety training. Numerous academics concur on this conclusion. In line with previous research, this study found a statistically significant correlation between receiving health and safety training and a reduction in WMSDs [18, 31]. Refreshing and motivating employees about occupational health, safety, standards, and practices through health and safety training may lead to a reduction in work-related medical disorders. It is clear that workers who have received professional training are more likely to adhere to safety regulations and possess more awareness regarding preventing musculoskeletal issues at work.

When comparing the reference group of workers who worked eight hours or fewer each day to the longer-working employees, the latter were three times more likely to acquire WRMSDs. extended workdays interspersed with sporadic or nonexistent breaks. This result has been verified and reported by other study [30, 32]. Additionally, those who performed repetitive motions at work had a twofold increased risk of getting WMSDs in comparison to those who did not. Comparable studies have demonstrated that the greatest risk of developing MSDs is for workers to undertake extremely repetitive occupations [18]. Task frequency is a significant risk factor for WMSDs since a worker's recovery cannot be fully achieved in the brief time between tasks. Limitation of this study due to its reliance on participant self-reported data, the outcome could be constrained by recall bias. Did not employ any scale of measurement to determine the participants' reported levels of pain was another limitation.

5. Conclusions

The study on work-related musculoskeletal disorders among coffee processing factory workers in Ethiopia revealed a high prevalence of these disorders, with the limbs, shoulders, neck, upper back, lower back, and hands being the most commonly affected body parts. Factors such as sex, marital status, physical activity habits, work-related stress, workplace health and safety training, working hours per day, and repetitive work were found to be significantly associated with work-related musculoskeletal disorders. The study underscores the importance of promoting training, minimizing extra working hours, using mechanical means to lift heavy objects, and creating a conducive workplace environment to control and prevent work-related musculoskeletal disorders among coffee processing workers in Ethiopia.

Abbreviations

AOR Adjusted Odds Ratio

BMI Body Mass Index
 COR Crude Odds Ratio
 CI Confidence Interval
 MSDs Musculoskeletal Disorders
 WRMSDs Work Related Musculoskeletal Disorders

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Ethical Approval and Consent to Participate

The ethical approval of the study was obtained from the Ethical Review Board of Addis Ababa University School of Public Health granted ethical clearance with approval numbers of (Ref. No. SPH/154/2023). Formal letter for collaboration was obtained from school of public health, College of Health Sciences, Addis Ababa University. The purpose of the study was explained to study participants. Data collection was started after permissions obtained from the coffee factory and Oral consent for the study was obtained from respected participants after a necessary explanation. Confidentiality of the information was assured and the privacy of the respondents was maintained. All the process of the study conducted based on the guideline and regulations of the Helsinki Declaration's.

Author Contributions

Getahun Legesse: Conceptualization, Formal Analysis, Investigation, Methodology, Writing – original draft

Feyisa Shasho Bayisa: Data curation, Formal Analysis, Software, Writing – original draft, Writing – review & editing

Samson Wakuma: Project administration, Supervision, Validation, Writing – review & editing

Teferi Abegaz: Supervision, Validation, Writing – review & editing

Olira Legesse: Writing – review & editing

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Data Availability Statement

The data that support the findings of this study are available from the corresponding authors, upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

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