International Journal of Occupational Safety and Health

ISSN: 2091-0878 (Online) ISSN: 2738-9707 (Print)

Original Article

Work-related musculoskeletal disorders among workers of buffalo slaughterhouses in Kathmandu, Nepal

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Date of submission: 16.06.2024
Date of acceptance: 06.11.2024
Date of publication: 01.01.2025

Conflicts of interest: None
Supporting agencies: None
DOI:https://doi.org/10.3126/ijosh.v15i1.67899

ABSTRACT

Introduction: Slaughterhouse workers experience many health risks. Workers have a high prevalence of musculoskeletal disorders (MSD) including the most common discomfort located in the upper body parts. This study aimed to determine the prevalence of MSD and to identify the MSD in relation to age, and work experience amongst workers of a buffalo slaughterhouse in Kathmandu.

Methods: A cross-sectional study was conducted in ward number 19 of Kathmandu Municipality from September to October 2023 using a Nordic questionnaire among the workers of twelve buffalo slaughterhouses and included 96 workers by census method.

Results: The prevalence of MSD amongst workers of buffalo slaughterhouses was 30.2%. Most common musculoskeletal disorders in workers were in the lower back (14.6%), followed by the shoulder (13.5%), and neck (11.5%). Age group and work experience were strongly associated with musculoskeletal disorder and pain in the lower back, shoulder, neck, hands/wrists, and ankles/feet.

Conclusion: The prevalence of musculoskeletal disorders is very common among buffalo slaughterhouse workers. These workers were more susceptible to MSD, so we need to propose appropriate preventative strategies to control and reduce the occurrence of these disorders in workers of the buffalo slaughterhouse.

Keywords: Buffalo, Musculoskeletal Disorders, Slaughterhouse

Introduction

Musculoskeletal disorders (MSDs) are injuries or disorders affecting the muscles, nerves, tendons, joints, cartilage, and spinal discs. Work-related musculoskeletal disorders (WMSDs) are conditions significantly influenced by the work environment and performance of work, often exacerbated or prolonged due to work conditions.[1]

MSDs represent a major occupational health issue for workers. According to the Department of Occupational Safety and Health (DOSH), ergonomic hazards include various factors such as repetitive movements, prolonged sitting, and awkward postures.[2] Ergonomic risk assessment is a tool used to identify risk factors for workers and MSDs, with the primary method being the Nordic Musculoskeletal Questionnaire (NMQ). The Nordic questionnaire, developed by Kourinka et al. in 1987, is used to analyze musculoskeletal symptoms in an ergonomic or occupational health context.[3] These symptoms include complaints of pain, numbness, and discomfort in body regions

such as the neck, shoulders, upper back, elbows, hands/wrists, lower back, hips/thighs, knees, and ankles/feet.[2,4]

Workers may be exposed to hazardous working environments and potential risks that result in physical pain, discomfort, and restricted mobility in bones, joints, ligaments, tendons, blood vessels, or muscles.[1,5,6] The risk factors include physical and biological factors, social psychology, workers, equipment, work environment, and working conditions. Significant risk factors are typically associated with increased compensation and health costs, reduced productivity, and lower quality of life for workers.[7]

In 2020, WMSDs were the leading cause of sickness in the USA, with a prevalence rate of 31% among 0.35 million people (29.8 per 10,000 labor force). The most commonly affected body parts were the trunk (47.03%), back (including the spine and spinal cord) (32.64%), and upper extremities (31.42%).[8] According to the Social Security Office in Thailand, WMSDs from poor working conditions were the top-ranked issue in 2020, with the most common causes being sprains and muscle stiffness due to poor working posture and lifting (16.4%).[9]

In the meat processing industry, 64.9% of workers frequently reported effects of WMSDs, including fatigue, swelling, and pain, which impact their quality of life and ability to perform daily activities.[10] Workers in slaughterhouses are exposed to various risk factors, including repetitive motions and poor posture, leading to a high prevalence of wrist or hand pain (54.8%).[11] According to a report by the New Zealand Industry Training Organization, the meat processing industry has the highest incidence of WMSDs compared to other sectors in the country.[12] This study aims to determine the prevalence of WMSDs among workers in buffalo slaughterhouses.

Methods

This study was a cross-sectional study design. The study included 96 workers from 12 buffalo slaughterhouses in Ward No. 19 of Kathmandu Municipality, enrolled using the census method. Data collection took place from September to October 2023.

The study participants comprised all workers from the slaughterhouses in Ward No. 19, Kathmandu. All workers who are above 18 year of age and at least one year of working in the slaughter house were included and the workers who had musculoskeletal disorder due to other causes excluded. Data were collected via interviews using a validated questionnaire to assess the prevalence of work-related musculoskeletal disorders (WMSDs). The first section gathered demographic information, including age, sex, marital status, education, body mass index (BMI), smoking, alcohol use, and medical history. The second section collected work-related information, including pain sites in the body, working duration, work experience, workplace accidents, seriously affected body parts, and perceived health risks associated with the job. Workers aged 18 years and above with at least one year of work experience were included in the study, while those with musculoskeletal problems due to accidents or other reasons were excluded.

Ethical approval was obtained from the Institutional Review Committee of the Nepalese Army Institute of Health Sciences, Sanobharyang, Kathmandu (Ref. No. 873/7th September 2023). Permission was also secured from the owners of the slaughterhouses. Written informed consent was obtained from all participants before data collection commenced, and the confidentiality of all respondents' information was maintained. The researcher ensured the integrity and quality of the research.

The collected data were entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 16.0 for Windows (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to summarize the study variables, with means and standard deviations for continuous variables and frequencies and percentages for categorical variables. Fisher's exact test was used to identify associations between body part pain and work experience and age group, with a p-value of < 0.05 considered statistically significant.

Results

The study found that participants' ages ranged from 18 to 45 years. The mean age was 26.94 years with Standard Deviation of 5.99 years. The mean work experience was 6.71 years Standard Deviation of 5.21 years, and the mean working hours per day were 9.88 hours with Standard Deviation of 1.41 hours. (Table 1)

Table 1: Demographic characteristics of the participants (n=96)

Characteristic	Mean ±SD
Age (in years)	26.94 ±5.99
Worked Experience (in years)	6.71 ±5.21
Work duration (hour/day)	9.88 ± 1.41
BMI (kg/m^2)	25.28 ± 2.95

Majority of the participants 94 (97.9%) were male and 2(2.1%) were female. In terms of ethnicity, 77(80.2%) belonged to the Janjati group, and 78 (81.2%) followed Buddhism. Marital status revealed that 75 (78.1%) were married, 21 (21.9%) were unmarried, and 86 (89.6%) had attained secondary education. More than half 49 (51.0%) of the workers were current smokers, and 55 (57.3%) consumed alcohol occasionally. The health status assessment by BMI indicated that 66 (68.8%) were in the pre-obese category and 27 (28.1%) had a normal BMI (Table 2).

Table 2: Demographic characteristics of the participants (n=96).

Characteristic		Number of workers (%)
Age Group	≤ 30	76(79.2)
	> 30	20(20.8)
Sex	Male	94(97.9)
	Female	2(2.1)
Caste	Chhetri	1(1.0)
	Janjati	77(80.2)
Religion	Buddhist	78(81.2)
	Muslim	18(18.8)
Marital status	Single	21(21.9)
	Married	75(78.1)
Education status	Primary	10(10.4)
	Secondary	86(89.6)
Smoking	Never smoke	19(19.8)
	Former smoker	28(29.2)
	Current smoker	49(51.0)
Alcohol used	Never	20(20.8)
	Weekly	21(21.9)
	Occasionally	55(57.3)
Body Mass Index (kg/m^2)	Normal	27(28.1)
	Pre obese	66(68.8)
	Obese	3(3.1)

The prevalence rate of musculoskeletal disorders (MSDs) was 30.2% (n=29). Pain or discomfort predominantly occurred in the lower back (14.6%), shoulder (13.5%), and neck (11.5%). Other affected body parts included the knee (7.3%), ankle/foot (7.3%), and upper back (4.2%). (Table 3)

Table 3: Distribution of musculoskeletal disorder by body part among the workers (n=96, Multiple responses)

Body part	Number (Percentage)
Neck	11(11.5)
Shoulder	13(13.5)
Upper back	4(4.2)
Lower back	14(14.6)
Knee	7(7.3)
Ankle/ Foot	7(7.3)
Upper arm, Lower arm, Hand/wrist	5(5.1)

Associations between musculoskeletal disorders and variables age and work experience were tested using Fisher's exact test. The prevalence of neck, shoulder, lower back, hand/wrist, and knee disorders was significantly associated with work experience of 1 to 10 years and more than 10 years ($p < 0.05$). Additionally, the prevalence of neck, shoulder, upper back, and hand/wrist disorders was significantly associated with age groups less than 30 years and more than 30 years ($p < 0.05$). (Table 4)

Table 4: Association between demographic characteristics and prevalence of MSD

Characteristics	Work Experience (in years)		p-value	Age Group (in years)		p-value
	1-10	>10		≤ 30	>30	
Neck	6(6.2)	5(5.2)	0.004	6(6.2)	5(5.2)	0.048
Shoulders	6(6.2)	15(15.6)	0.001	6(6.2)	7(7.3)	0.005
Upper back	2(2.0)	2(2.1)	0.053	1(1.0)	3(3.1)	0.028
Lower back	11(11.4)	3(3.1)	0.001	10(10.4)	4(4.2)	0.481
Upper arm	0(0.0)	1(1.0)	0.156	1(1.0)	0(0.0)	1.000
Lower arm	1(1.0)	0(0.0)	1.000	1(1.0)	0(0.0)	1.000
Hand/ Wrist	1(1.0)	2(2.0)	0.013	0(0.0)	0(0.0)	0.008
Knees	4(4.2)	3(3.1)	0.039	4(4.2)	3(3.1)	0.155
Ankles/ Foot	5(5.2)	2(2.0)	0.327	5(5.2)	2(2.0)	0.601

Discussion

Musculoskeletal disorders (MSDs) represent a globally prevalent health concern, with a particularly high incidence observed among slaughterhouse workers. These workers are frequently affected by MSDs, reporting pain in multiple regions of the body. The upper body, including the shoulders, neck, and arms, is most commonly affected due to the repetitive, strenuous, and physically demanding nature of the tasks involved in meat processing.

This study found that 30.2% of workers reported experiencing pain or discomfort from one or more musculoskeletal disorders (MSDs) in the past 12 months. The prevalence observed in this study is notably lower than the 64.9% reported by Mansi S. in a study conducted on the South Island of New Zealand.[11] Similarly, a study by Sompan et al. in Thailand found a significantly higher prevalence of MSDs, with 93.5% of workers in pig slaughterhouses reporting MSD symptoms over the past 12 months.[13]

A study conducted in Brazil by Tirloni AS reported a prevalence of musculoskeletal disorders (MSDs) of 71.2% among poultry slaughterhouse workers, with the most frequently reported symptoms being pain, tingling, and fatigue.[14] The lower prevalence rate observed in the present study may be attributable to several factors, including variations in outcome assessments (e.g., differing questionnaires), methodological limitations such as small sample sizes and incomplete reporting, and disparities in the work environment. Additionally, estimating the prevalence of MSDs using self-reported questionnaires could potentially overestimate the actual prevalence compared to more objective methods, such as clinical evaluations.

In the present study, the most affected regions among workers were the lower back (14.6%), shoulder (13.5%), and neck (11.5%), followed by the ankle/foot (7.3%) and hand/wrist (3.1%). Various studies have identified that musculoskeletal disorders in the wrists, shoulders, neck, and lower back are commonly linked to the performance of highly repetitive tasks, lifting heavy loads, working in awkward postures, and maintaining these positions for prolonged periods. These factors significantly contribute to the development of MSDs among workers.

The findings of this study report lower prevalence rates compared to a study among slaughterhouse workers in New Zealand by Mansi S., which recorded higher prevalence rates of musculoskeletal disorders in the neck (39.5%), shoulders (37.3%), hand/wrist (54.8%), lower back (43.5%), and upper back (26.6%).[11] Similarly, a study in Thailand by R. Sompan et al.[13] observed that 25.9% of workers in pig slaughterhouses reported higher pain in the hands/wrists, followed by 22.2% in the shoulder, 5.8% in the lower back, and 1.9% in the neck. In another study conducted in Brazil by Tirloni AS et al.[14] the most frequent complaints were shoulder pain (50.3%), arm pain (34.3%), wrist pain (23.4%), and hand pain (21.8%).

A study conducted in Brazil by Franca et al. reported that approximately 72% of employees experienced shoulder pain, 60% reported hand and wrist pain, 68% experienced pain in the cervical region, and 74% in the lumbar region.[15] Similarly, a study in Bangladesh by Shamsi et al. found that 61% of butchers sought medical attention for back pain, 62% for shoulder pain, and 51% for neck pain.[16] Wrist and hand complaints are particularly common among workers engaged in hand-intensive tasks. Strenuous manual labor, prolonged exertion, and repetitive movements—either individually or in combination with other physical demands—are significant contributors to the development of musculoskeletal disorders in the wrists and hands, especially in the meat industry.

The overall prevalence of musculoskeletal disorders (MSDs) in the present study was lower compared to findings from other studies. This discrepancy may be attributed to the fact that the workers in this study were employed on a daily wage basis and were not permanent employees. These workers typically handle tools such as knives, axes, and sharpeners throughout their shifts and often work in a squatting position. When experiencing any physical discomfort, they tend to change jobs, which may reduce the likelihood of prolonged exposure to risk factors for MSDs. Additionally, the mean age of the workers in this study was approximately 27 years, which is lower than the mean age reported in other study populations, possibly contributing to the lower prevalence of MSDs.

The current study identified associations between socio-demographic factors, such as age group and work experience, and the prevalence of musculoskeletal disorders (MSDs). Notably,

MSDs in the lower back, shoulder, neck, knees, and ankles were significantly prevalent. These findings align with similar results reported by Mansi S. in a study of slaughterhouse workers in New Zealand.[11]However, no statistically significant differences were observed in the prevalence of MSDs affecting the upper back, upper arm, lower arm, or ankle/foot regions.

In the current study, the age group was significantly associated with musculoskeletal disorders (MSDs) in the neck, shoulders, upper back, and wrists/hands. This finding is consistent with previous literature, where studies have demonstrated a significant association between age and the prevalence of MSDs. Age-related physiological changes, combined with cumulative exposure to occupational risk factors, likely contribute to this increased susceptibility in older age groups.[13]

However, there have been limited studies conducted specifically on workers in buffalo slaughterhouses. Healthy workers contribute positively to their families and society, as their productivity enhances overall economic well-being. When workers maintain good health, there is a reduced demand for healthcare services, allowing them to perform their tasks more effectively. Implementing health promotion strategies to mitigate risk factors can help workers prevent and reduce the incidence of injuries, ultimately leading to improved quality of life. This approach emphasizes the importance of occupational health interventions tailored to the unique challenges faced by workers in this industry. The limitations of research are the study was conducted in one ward of Kathmandu Metropolitan city and small sample size. Results may not be generalized for all Nepalese people.

Conclusion

In conclusion, the prevalence of musculoskeletal disorders (MSDs) among workers in buffalo slaughterhouses was found to be 30.2%. Most workers engaged in repetitive tasks that required significant exertion of the hands and arms, such as holding knives, axes, and sharpeners for cutting and trimming. The highest prevalence rates of MSDs were observed in the lower back, shoulders, neck, and hands/wrists, with additional occurrences noted in the knees and ankles/feet. This pattern may be attributed to the continuous use of tools and the squatting positions adopted during work.

Given the susceptibility of this population to MSDs, it is crucial to propose appropriate preventive strategies aimed at controlling and reducing the incidence of these disorders among buffalo slaughterhouse workers. Therefore, implementing ergonomic strategies to mitigate the risk factors associated with MSDs is essential for enhancing worker health and safety.

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