Research Article

Musculoskeletal Related Disorders among Electrical Employees in Southeast, Nigeria

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ABSTRACT

There is insufficient literature on the musculoskeletal related disorders among electrical employees in South-East, Nigeria. This study aimed to investigate the prevalence and pattern of distribution of musculoskeletal disorders (MSDs) among electrical employees in south-east, Nigeria. A cross sectional Study. Socio-demographic characteristics, Job background, prevalence and pattern of MSDs of 109 electrical employees (19- 57 years) were investigated using a standard Nordic questionnaire. The data collected was analysed using statistical package for social science (SPSS) version 20. The study revealed a high rate of MSD among electrical employees (88.1%). The most affected regions were neck (55.0%), followed by the lower back and shoulders (51.4% each), then the upper back (46.8%), wrists/hands (44.0%), Knees (36.7%), hips/thighs and ankles/feet (33.0% each), the elbow (29.4%). There was a significant relationship between the prevalence of musculoskeletal related disorders and the highest educational status of the electrical employees. High prevalence of musculoskeletal disorders exists among electrical employees. Trainings on correct ergonomic practices is recommended to be carried out in this population.

Keywords: Musculoskeletal related disorders, electrical employees, prevalence, pattern, ergonomics

INTRODUCTION

Musculoskeletal disorder is defined as the disorder of the muscles, tendon, joints, intervertebral discs, peripheral nerves and vascular system, not directly resulting from an acute or simultaneous event but installing gradually and chronically (World Health Organization, 2022). They are some of the most disabling and expensive conditions in the United States. Sometimes, doing certain actions over and over again, forces or vibrations on human body can cause injury to the human body. Musculoskeletal symptoms can occur due to past injuries, existing physical conditions, genetic factors, our day-to-day habits and even poor diet.

Musculoskeletal disorders are a common reason for physical and occupational disability and activity limitations (Palazzo *et al*, 2014). The etiology of musculoskeletal pain is now generally accepted to be multi-factorial including physical, psychological and social influences. Age, sex and working with improper position, lift heavy things every day and physically strenuous work increases the risk of musculoskeletal pain remarkably (Center for Disease Control and Prevention (2019). Additionally, in working-age adults, psychological factors play a role in causing pain, the transition from acute to chronic, and are typically more strongly associated with pain-related disability than the biomedical and mechanical factors considered (Ris *et al*, 2019).

Work- related musculoskeletal symptoms can be seen at workplaces when there is variation between the physical capacity of the human body and the physical requirements of the task Work-related MSDs refer to injuries developed over time that are caused by a combination of risk factors that act simultaneously on a joint or body region, in a synergistic effect. Work related musculoskeletal disorders (WRMSDs) encompass a range of degenerative and inflammatory

conditions that impact various components of the body such as blood vessels, nerves, joints, ligaments, tendons and muscles (GCOHS (2023).

Repetitive and physically demanding working conditions has been consistently linked to the prevalence of these disorders, making them a significant occupational concern for companies. Despite numerous attempts to mitigate their occurrence through engineering design changes, organizational modifications, and training programs, work-related musculoskeletal disorders continue to cause immense suffering for individuals and pose significant burdens on both companies and healthcare systems (Nunes, 2009). It is important to note that these disorders primarily stem from and are exacerbated by the nature of the work being performed. The upper extremities, neck and back are particularly susceptible to these conditions.

We know there is a strong relationship between musculoskeletal disorders and the way people work, especially when it comes to physical factors that can cause harm (e.g., awkward postures, high repetition, force exertion, static work, cold or vibration) (Graves *et al*, 2014). Work intensification, stress and other psychosocial factors that increasingly causing these disorders to occur. There are many reasons why people develop work-related musculoskeletal disorders and there are different things at work that can increase the chances of getting these problems. Workers often experience a combination of factors simultaneously and we may not always know how these factors interact with each other.

Electricity utility workers are saddled with the responsibility of generating, transmitting and distribution of electric power from electricity corporations to the people who use it (Schwarz. and Drudi, 2018). Their work usually involve various levels and types of risks at work. This means that there can be different types of injuries, such as physical injuries caused by not using proper body movements or by being hurt by tools at work, electrical injuries and injuries caused by mental and emotional factors like having too much work, work stress or working in a bad environment. Electricity utility workers are most likely to die from electrical injuries; however, there is also a growing number of workers in the electrical industry who are experiencing WMSDs. This is affecting their quality of life, overall health, and productivity. Fordyce *et al*. (2016) while studying injuries in electricity utility workers in the United States, it was found that sprains and strains were very common among them.

Musculoskeletal disorders include injuries of soft tissues (nerves, connective tissues and muscles) and the musculoskeletal systems as a result of traumatic and non-traumatic injuries, overexertion of bodily structures, repetitive movements, tasks at both small and large scales, and reactions to physical strain (Yelin *et al*, 2016). Workers in electric generation plants do many regular checks and fixes on machines. The work done by people in the electric industry is often physically demanding and challenging. WMSDs could result from these work patterns and thus lead to reduced work output and decline in leisure and recreational activities (Rogerson *et al* 2024). Reports amongst electrical employees show diminished workers and society productivity, high rates of specialists' sick leave, increased cost of workers'

compensation and loss of millions of dollars as a result of electricity deprivation of a modern society which depends largely on electricity (Korhan and Memon, 2019). Hence, identification and prevention of WMSDs amongst workers are important.

The importance of electricity cannot be over-emphasized and so there's a need for efficient electrical employees. Increase in work-related musculoskeletal disorders amongst electricity employees will lead to major issues in electricity generation, transmission and distribution in the country. However, there is paucity of data on this subject matter. This study aims to determine the rate of musculoskeletal related disorders among electrical employees in South Eastern Nigeria and the prevalent body areas on which they occur.
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MATERIALS AND METHODS

Study design: A cross-sectional survey.

Ethical approval: This study's proposal was reviewed by the ethical committee of the Molecular Pathology Institute, Enugu State and approval was given.

Participants: A total of 109 electrical employees were randomly selected from the electrical employees around South-east, Nigeria.

Procedure: After the approval was gotten from the ethical body, letters were sent to the head of the electrical companies and physical meetings were held as well to gain the approval of the head-in-charge and to request for assistance in facilitating the study among workers. Numbered questionnaires and consent forms were delivered to the workers with detailed instructions on how to fill them. Online questionnaires were also distributed to employees within south-east. These questionnaires also contained consent forms and detailed instructions on how to fill them.

The copies were distributed by the researcher to the prospective respondents on personal contact basis at their places of work. The researcher waited for the questionnaire to be filled and then collect them. The data was collected by interviews for participants who do not understand the questionnaire to enable effective participation in the research study. The questionnaire was randomly distributed by convenience.

Instruments: The instrument used in this study is the questionnaire used is the Nordic musculoskeletal questionnaire. It was developed by Kourinka *et al*., 1987. It is a standardized instrument used to analyze musculoskeletal pain and the questionnaire was shared by the researcher and online copies were also sent. The questionnaire is used to compare low back, neck, shoulder and general complaints. The section one is used to collect data on participants' demographic variables while the section two assesses the complaints. The validation of the Nordic musculoskeletal disorder showed a similarity (100%) between the self-administered NMQ and the interview results and the specificity value were obtained in the lower back, neck and

shoulder region above (85%) with a specificity value reaching (100%). Reliability test results obtained Cronbach's Alpha value above (0.945) which means that the reliability is excellent (Chairani, 2020).

Data Analysis

The data from this study was analyzed using the statistical package for the social sciences (SPSS20.0, windows evaluation version). Descriptive analysis of frequency distribution and percentages and inferential statistics of chi-square was used. Alpha level is set at P<0.05.

RESULTS

A total of 109 questionnaires were distributed both physical and online distribution. All questionnaires were filled and returned, resulting in a 100% return rate. The prevalence of musculoskeletal disorder among the respondents revealed that 96(88.1%) had musculoskeletal pain while 13(11.9%) did not (Table 1). The participants were both male 73(69.7%) and female 33(30.3%). Their age ranges from 19-65years with a frequency of 28(25.7%) for the 18-24 range, 48 (44.0%) for the 25-34 range, 19 (17.4%) for the 35-44 range, 11(10.1%) for the 45-54 range, 2(1.8%) for the 54-64 range and 1(0.9%) for the >65 range. It showed that 1(0.9%) had no formal education, 1(0.9%) attained primary education only, 12(11.0%) attained secondary education while 95(87.5%) tertiary education. It also showed that 12(11.0%) were under weight, 47(43.1%) had healthy weight, 34(31.2%) were overweight and 16(14.7%) were obese (Table 2).

Table 1

Frequency and percentage distribution for the prevalence of musculoskeletal pain among electrical workers in south-east, Nigeria.

Variables		F	%
Have you at any time suffered from any musculoskeletal disorder since you resumed work as an electrical employee?	No	13	11.9
	Yes	96	88.1

F = frequency

Region of the body with the highest rate of pain was the neck 60(55.0%) followed by the lower back and the shoulders having 56(51.4%) each, then the upper back 51(46.8%), wrist/hand 48 (44.0%), Knees 40(36.7%), hips/thighs and ankles/feet both having 36(33.0%) each and then the elbow 32(29.4%) having the least rate of pain (Table 3). There was no significant relationship between the prevalence of musculoskeletal disorder and age (p=0.277), sex (p=0.547), BMI (p=0.920) but there's a significant relationship between the prevalence of musculoskeletal disorder and educational status (p=0.047) among electrical employees in south-east, Nigeria as shown in Table 4.

There was also no significant association between the prevalence of musculoskeletal disorders and their daily length of work (p=0.887), work days per week (p=0.904), working

hour schedule (p=0.558), Years of working experience (p=3.0137) (Table 5).

Table 2:

Descriptive statistics of demographic data

Variables		Frequency	Percentage
Gender	Male	76	69.7
	Female	33	30.3
Age	18-24	28	25.7
	25-34	48	44.0
	35-44	19	17.4
	45-54	11	10.1
	54-64	2	1.8
	>65	1	0.9
Highest educational status	None	1	0.9
	Primary	1	0.9
	Secondary	12	11.0
	Tertiary	95	87.2
Grouped BMI	Under weight	12	11.0
	Healthy weight	47	43.1
	Over weight	34	31.2
	Obesity	16	14.7

Table 3

Pattern of pain distribution in electrical employees who have experienced work-related musculoskeletal disorder with respect to the following body region

Variables	Body region	F	%
Have you had any trouble during the last 12 months (ache, pain, discomfort, numbness)	Neck	60	55.0
	Right Shoulder	17	15.6
	Left Shoulder	14	12.8
	Both Shoulders	25	22.9
	Right Elbow	10	9.2
	Left Elbow	9	8.3
	Both Elbows	13	11.9
	Right wrist/hand	24	22.0
	Left wrist/hand	14	12.8
	Both wrists/hands	10	9.2
	Upper back	51	46.8
	Lower Back	56	51.4
	Hips/Thighs	36	33.0
	Knees	40	36.7
	Ankles/feet	36	33.0

F = frequency

DISCUSSION

The results of this study show that there's a high prevalence of musculoskeletal disorders among electrical employees in South-East, Nigeria. The prevalence of musculoskeletal disorders amongst electrical employees in south-east, Nigeria in this study was observed to be 96(88.1%) which is above average (50%). This may be due to wrong working postures and continuous repetitions of a particular movement without rest. This is consistent with the findings of Okafor *et al* (2021) who also reported similar values. Padmanathan *et al* (2016) also reported a prevalence of about 53% of musculoskeletal symptoms among linemen workers in China.

Table 4
Musculoskeletal related disorder and demographic characteristics such as age, sex, education and BMI

Variables			
Demographic data	Chi-square values	Df	Sig (2 sided)
Age	6.308	5	0.277
Sex	0.362	1	0.547
Highest educational status	7.954	3	0.047
Grouped Body mass index	0.185	3	0.920

Table 5
Relationship between the occurrence of musculoskeletal disorders and their Job background (daily length of work, work days per week, working hour schedule and years of working experience)

Variables			
Job Background	Chi-Square Values	Df	sig
Daily length of work	0.639	3	0.887
Work days per week	0.565	3	0.904
Working hour Schedule	2.070	3	0.558
Years of working experience	5.529	3	3.0137

Among electrical employees, the 1-year prevalence of musculoskeletal related disorders with respect to body region reported that pain was highest at the neck 60 (55.0%), followed by the lower back and the shoulders having 56(51.4%) each, then the upper back 51(46.8%), wrist/hand 48 (44.0%), Knees 40(36.7%), hips/thighs and ankles/feet both having 36(33.0%) each and then the elbow 32(29.4%) having the least rate of pain. This result showed that pain was equally distributed in some regions. This is similar with the work by Lee Y. *et al.* (2023)[17] on construction workers who reported that the neck was the most commonly affected body part followed by the shoulders. However, the findings of Okafor *et al.* (2021) were different. Okafor *et al.* (2021) found out that the highest prevalence of work-related disorder was seen in wrists and hands. He attributed it to the increased use of grip strength in performing routine activities in several repetitions.

This study also evaluated the relationship between musculoskeletal related disorder and demographic data. The study found that there was no significant relationship between age, sex and BMI but there was a significant relationship with their educational status. These findings agree with the findings of Taghinejad *et al.* (2016) who found that among nurses. Age, gender and BMI had no significant association with prevalence of musculoskeletal disorders.

In this study most of the electrical workers had finished their tertiary education (87.2%). WRMSDs in this population may be because correct ergonomic practices and correct working postures are not being taught in schools. Schools should teach correct working postures to students and it should be inculcated in every curriculum. This will help prevent young workers from developing musculoskeletal related disorders quite early in the profession.
There was no relationship between the musculoskeletal pain and length of working years. However, the study by Ojukwu

et al (2018) found out that among teachers there was a significant relationship between their musculoskeletal disorders and the length of time they have been working. This difference may be due to the fact that the teachers in the above-mentioned study has been working for a longer period of time compared to the electrical utility workers in this study. Most of the electrical employees had very few years of working experience.

In conclusion, there's a high prevalence of musculoskeletal disorders among electrical employees in South-East, Nigeria. Musculoskeletal disorders among electrical employees in South-East occurs mostly in the neck 60 (55.0%), followed by the lower back and the shoulders having 56(51.4%) each, then the upper back 51(46.8%), wrist/hand 48 (44.0%), Knees 40(36.7%), hips/thighs and ankles/feet both having 36(33.0%) each and then the elbow 32(29.4%).

There's a significant relationship between musculoskeletal related disorder and the highest educational status. However, there's no significant relationship between the musculoskeletal disorders and sex, age and body mass index. There was also no significant relationship between the musculoskeletal disorders and the job background of electrical employees in south-east, Nigeria

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