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Prevalence and pattern of work related musculoskeletal disorders among blacksmiths in Kurmi market, Kano: north-western Nigeria

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ABSTRACT

The study was carried out to identify the prevalence and pattern of work related musculoskeletal disorders among blacksmiths in Kurmi market, Kano state. A total of 138 blacksmiths were recruited out of which only 133 were able to fill the questionnaire properly. Data collected was analysed using descriptive statistics of frequency, percentages, tables, and charts, using SPSS version 15. Result obtained showed that there is high prevalence of work related musculoskeletal disorders among the studied population (43.3%), in which shoulder region is the most frequent area of affectation in 39.6% of the total symptoms reported. The predominant risk factors were high repetitive motion (85.7%), prolonged sitting (95.5%), and greater number of working hours i.e 5-8 hours for most days in 34.6% of the total population. Among the entire study population (n=133); only 30 ever attended hospital to seek for medical attention against their symptoms/complaints, out of which only 15 were seen by a physiotherapist. Also 7 out of the total study population ever absent themselves from work secondary to their symptoms. It was concluded that there is a high prevalence of WMSDs among blacksmiths. The upper extremity region of the body is more affected than lower extremities. Increasing age, weight and working for long hours or days were major risk factors to developing WMSDs.

Keywords: Work related Musculoskeletal Disorders, Blacksmith, Prevalence, Pattern

1. INTRODUCTION

Work-related musculoskeletal disorders (WMSDs) are a group of painful disorders of muscles, tendons, nerves caused by work activities which are frequent and repetitive or activities with awkward postures [1]. Body regions most commonly affected are the lower back, neck, shoulder, forearm, and hand, although recently the lower extremity has received more attention [2]. Musculoskeletal disorders (MSDs) are one of the leading causes of disability in industrialized societies. While the exact proportion of WMSDs is unknown, it is known that the costs associated with these disorders are very high and primarily accounted for by compensation for lost workdays [3,38].

The tissues affected include tendons, muscles, ligaments, nerves and other tissues near the joints. Examples of WMSDs include back pain, neck pain, various types of tendonitis, bursitis, carpal tunnel syndrome[3,1]. Numerous risk factors including occupational, individual and social factors may be involved in the development of WMSDs; the work related risk factors include physical demands such as handling heavy loads, repetitive movements, forceful exertion, vibration, and maintaining awkward postures[3]. The effects of these factors depend on their duration, frequency, and intensity Individual factors (age, height, health status, level of physical fitness, etc.) may also contribute. However, exposure to a specific risk factor does not necessarily result in the development of MSDs, and the full range of factors must be taken into account when attempting to establish the cause of these disorders[3,2].

Work-related musculoskeletal disorders mainly affect the upper limb and the back but also affect other body parts such as the lower limb[4]. It is reported that out of 1,012,000 people who reported suffering a work-related MSD, only 18% (185, 000) reported disorders that mainly affected the lower limbs[5].

A number of studies has been carried out to investigate occupational disorders especially among healthcare providers in various work settings[6]. Across Europe 25% of workers complain of backache and 23% report muscular pains[7]. A number of studies had been carried out in Nigeria and this include studies on: Physiotherapists[8], institutions[9], factory workers[10], nursery staffs[11]. But little is known on blacksmiths. Blacksmithing is associated with numerous risk factors for developing WMSDs such as highly repetitive motion, carrying heavy loads, assuming poor posture, forceful hand applications, and direct mechanical pressure on body tissues, body vibrations and pace of work.

In Kano, various research studies have been conducted investigating musculoskeletal disorders among people in different work settings[12-15]. But limited or no study was carried out on blacksmiths in Kano hence the need to conduct the study, therefore the study concentrated on WMSDs among blacksmiths in Kurmi market of Kano North-western Nigeria.

2. METHODOLOGY

The study determined the prevalence and pattern of work related musculoskeletal disorders among blacksmiths in Kurmi market, Kano, Nigeria.

Research design

The study is a descriptive survey research design.

Population

The study population comprised of all male blacksmiths working at Kurmi market and its surrounding areas in Kano municipal local government area of Kano state, Nigeria.

Sample size and Sampling technique

A total of 138 Subjects were sampled out using judgmental sampling technique where only those that satisfied the inclusion criteria of the study were recruited. Blacksmiths that had a working experience of at least 12 months duration were included in the study. Those with Congenital musculoskeletal disorder. Examples are arthrogryposis, kyposis, scoliosis, Rheumatoid arthritis. And Previous musculoskeletal surgeries such as joint replacement were excluded from the study.

Data collection Instrument

1. Nordic musculoskeletal questionnaire (NMQ). This questionnaire was used as an assessment tool for WMSDs in different body regions[16].
2. Weighing Scale: A mechanical weighing scale recommended by UK Weighing Federation, SECA. Salter 148BKSVDRwas used to measure the weight of each subject.
3. Height measurement tool: A plastic tape measure was used to measure the height of each participant

Data collection procedure

An Introduction letter from the department was presented to the Association of blacksmiths, Kurmi market through their head. An informed consent form was sought, only those who signed the informed consent form were recruited. The purpose of the study was explained to them in order to get Maximum Corporation.

Measurements

Height: Each subject stood bare-footed with both feet together on a level platform/floor against a wall, with his upper back, buttocks and heels touching the wall, the head held erect with the eyes looking forward. The point of the greatest height of the subject was marked using a marker. The exact height was measured using a tape rule and recorded in meter[17].

Weight: The weight was measured using a portable bathroom scale with provision for calibration and recorded to the nearest 0.5 kg[18].

Body mass index (BMI): This was calculated by dividing weight of each subject in kilogram by the square of height of each subject in meters as shown in the following formula,

$$BMI\left(\frac{kg}{m^2}\right) = \frac{Weihgt\ (kg)}{Height\ (m^2)}$$

Questionnaire administration

The questionnaire was administered to the participants and retrieved same day. This was done along with some research assistants. Literate participants were allowed to fill the

questionnaires themselves, and those that were not literate were interviewed by the researcher and the questionnaires were filled as they responded. Completed questionnaires were collected from them individually. Each respondent answered 39 questions.

Data analysis

Data obtained were analyzed using Statistical package for the social sciences (SPSS) Version 15 on window software, and the results were presented using descriptive statistics of frequencies, percentages, distribution tables, and charts.

3. RESULTS

The outcome of this study is described according to socio demographic factors, symptom distribution in relation to body parts and BMI, risk factors, work absenteeism, implication of WMSDs in the tables below:

Table 1. Socio-demographic factors of the participants.

Variables	n(%)
Age (years)	
11-20	22(16.5)
21-30	36(27.1)
31-40	28(21.1)
41-50	18(13.5)
51-60	16(12.0)
61-70	11(8.3)
71-80	2(1.5)
Total	133(100)
Education	
Qur'anic	36(27.1)
Adult Education	15(11.3)
Primary	20(15)
Secondary	51(38.3)
Post secondary	11(8.3)
Total	133(100)
Marital status	
Single	50(37.6)
Married	80(60.2)

Divorced	2(1.5)
Widowed	1(0.75)
Total	133(100)

n = frequency, % = percentage

Table (1) above revealed that the participants recruited are of age between 11-80 years (n = 133), with largest number falling between age of 21-30 years (27.1%). Greater number of them (38.3%) possessed secondary level of education and about 60.2% of them are married.

Table 2. Symptoms (Pain or discomfort) in relation to Socio-demographic factors of the participants.

Variables Age (years)	n(%)	n(%) of SA	n(%) of MA	Total n(%)
11-20	22(16.5)	5(17.9)	10(15.1)	15(16.5)
21-30	36(27.1)	8(28.6)	12(19.1)	20(22.0)
31-40	28(21.1)	3(10.7)	12(19.1)	15(16.5)
41-50	18(13.5)	8(28.6)	6(9.5)	14(15.4)
51-60	16(12.0)	3(10.7)	11(17.5)	14(15.4)
61-70	11(8.3)	1(3.6)	10(15.9)	11(12.1)
71-80	2(1.5)	0	2(3.2)	2(2.2)
Total	133(100)	28(100)	63(100)	91(100)
Education				
Qur'anic	36(27.1)	4(14.3)	26(41.3)	30(32.9)
Adult Education	15(11.3)	4(14.3)	9(14.3)	13(14.3)
Primary	20(15)	5(17.9)	6(9.5)	11(12.1)
Secondary	51(38.3)	13(46.4)	20(31.7)	33(36.3)
Post secondary	11(8.3)	2(7.1)	2(3.2)	4(4.4)
Total	133(100)	28(100)	63(100)	91(100)
Marital status				
Single	50(37.6)	13(46.4)	19(30.2)	32(35.2)
Married	80(60.2)	14(50.0)	42(66.7)	56(61.5)
Divorced	2(1.5)	1(3.6)	1(1.6)	2(2.2)
Widowed	1(0.75)	0	1(1.6)	1(1.1)
Total	133(100)	28(100)	63(100)	91(100)

n = frequency, % = percentage, SA = Single Affectation 1, MA = Multiple Affectation

Table (2) shows the frequency of discomfort or pain (symptoms) reported among every age category, educational level and marital status is presented. From the table, it is

indicated that WMSDs is more frequent with increasing age, low educational level and among married participants (61.5%). Some of the participants reported multiple affectations in different body parts (47.4% of the total population).

Table 3. Total number of symptoms reported at different body parts

Body region	Total n (%)
Neck	13(8.4)
Shoulders	61(39.6)
Elbows	2(1.3)
Wrists	23(14.9)
Upper work	4(2.6)
Lower back	39(29.3)
Hips	10(6.5)
Knees	2(1.3)
Ankles Total	0 154(100)

n = frequency, % = percentage

Table (3) above shows the total number of symptoms reported at different body parts, in which shoulder symptoms scored the highest frequency (39.6%) of the total reported symptoms. The lowest regional symptom reported was at elbow and knee joints (1.3% each) with no affectation at ankle joint.

Table 4. Symptom distribution in relation to the BMI of the participants

BMI	n (%)	n (%) of SA	n (%) of MA	Total n (%)
Under weight	14(10.5)	5(17.9)	4(6.4)	9(9.9)
Normal weight	111(83.5)	23(82.1)	52(82.5)	75(82.4)
Over weight Total	8(6.0) 133(100)	0 28(100)	7(11.1) 63(100)	7(7.7) 91(100)

n = frequency, % = percentage, SA = Single Affectation, MA = Multiple Affectation

Table (4) shows that almost more than half of all classes of weight have one or more form of symptom(s). The highest reported symptom was in the over weight class of participants, in which seven (7) out of the total eight (8) reported multiple affectation.

From Table (5) above, it is indicated that most of the participants worked for at least 5-8 hours per day (34.6%), and for 5-6 days per week (30.8%). The nature of work of most participants is repetitive with force application, and the posture mostly adopted is sitting in 95.5% of the participants as summarized in the table.

Table (6) showed that Participants have variable years of service which is age dependent that is the more aged participant is, the more the working duration. However, most participants have a working duration of 11-20 years (33.8%) as presented in the table.

Table 5. Risk factors of WMSDs

Variable	n (%)
Working pace (hours) 1-4	35(26.3)
5-8	46 (34.6)
9-12	33(24.8)
12& above	19(14.3)
Total	133(100)
Working days 1-2 3-4 5-6 Daily Total	29(21.8) 28(21.1) 41(30.8) 35 (26.3) 133(100)
Work nature Repetitive& forceful Vibratory Total	114 (85.7) 19 (14.3) 133(100)
Posture mostly adopted Sitting Standing **Total**	126 (95.5) 7 (4.5) 133(100)

n = frequency, % = percentage

Table 6. Number of years in the working environment

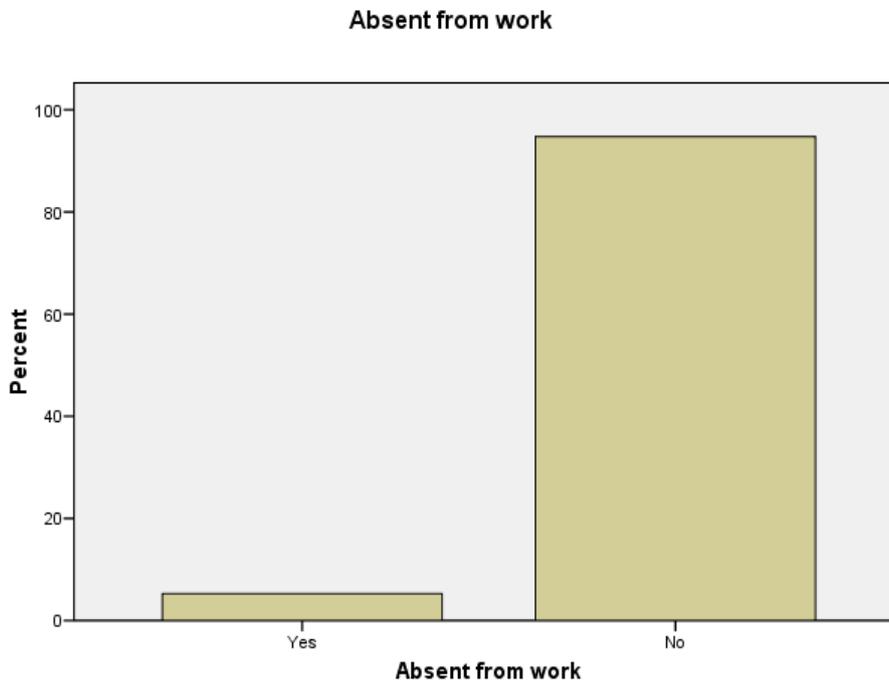| Year of service	n (%)
1-10	31(23.3)
11-20	45(33.8)
21-30	22(16.5)
31-40	25(18.8)
41-50	7(5.3)
51-60	3(2.3)
Total	133(100)

n = frequency, % = percentage

Figure 1. Absenteeism from work

Figure (1) above revealed that only seven (7) out of the total participants (n = 133) ever absents themselves from work as a result of their symptom. Figure (2) showed that only 22.6% (n = 30) out of the total participants (n = 133) ever attended hospital to request for medical attention against their pain or discomfort. The cost implication of WMSDs among

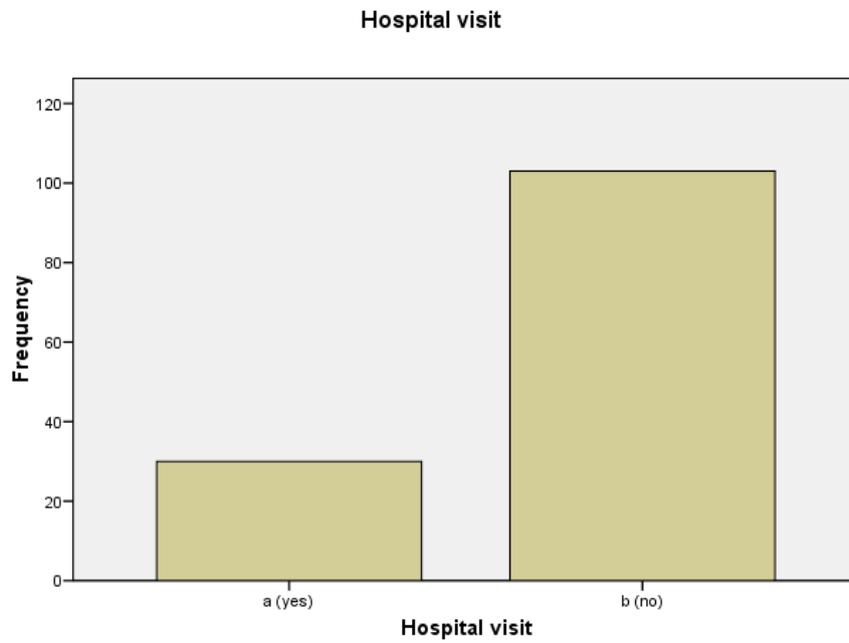blacksmiths includes absenteeism from work and frequent hospital visit as shown in Figures 1 & 2 above.

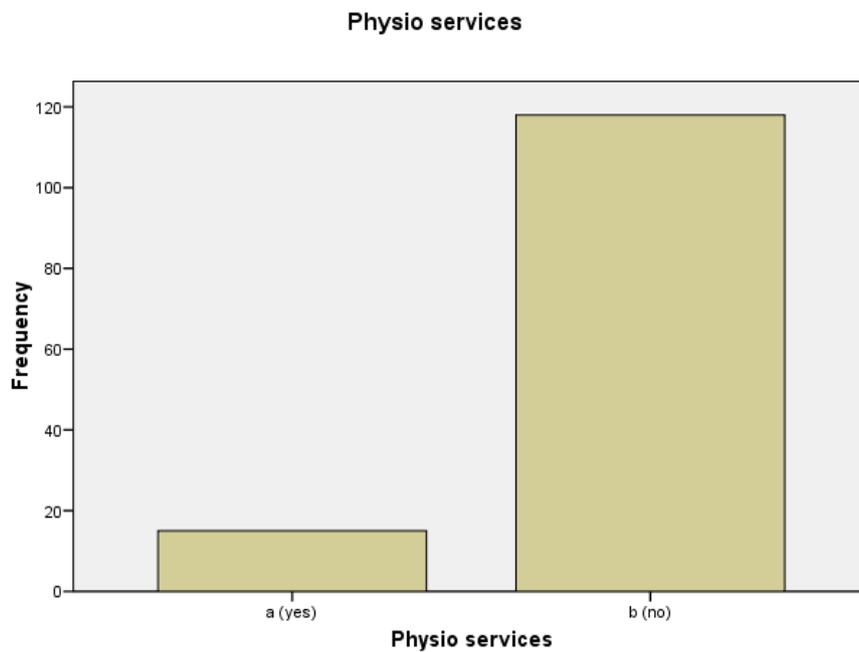

Figure 2. Hospital visit

Figure 3. Physiotherapy services

Figure (3) shows that only fifteen (n = 15) out of the total (n = 133) were ever seen by a physiotherapist following hospital visit.

4. DISCUSSION

Work related musculoskeletal disorders (WMSDs) are global occupational health problems not only to the workers and ergonomists but also to several health care professions including Physiotherapists; poor ergonomics is the principle cause of WMSDs. However, the proportion of WMSDs which could be avoided by achieving a safe and healthy work environment (good ergonomics) is difficult to estimate due to the highly multifactorial aetiology. The study describes the prevalence and pattern of work related musculoskeletal disorders among blacksmiths working in Kurmi market, Kano. This population has low control over their tasks in an unhygienic working environment.

The finding of this study revealed that there is high prevalence of WMSDs (43.3%) among blacksmiths of Kurmi market, Kano state which is consistent with the findings of the study in which WMSDs occurs in 66% and 80% of skilled and unskilled Blacksmiths respectively[19]. However, related to the proportion of work related lower extremity musculoskeletal disorders (WMSDs) (7.8%), there is high prevalence of work related upper extremity musculoskeletal disorders (WMSDs) which is 55.8% of the total body affectation, this coincides with the study conducted on skilled and unskilled blacksmiths in India[19]. Also 47.4% of the participants reported multiple body affection. In this study the highest prevalence of WMSDs occurs among age group of 61-70 years in which almost all of them experienced pain or discomfort in more than one of the nine defined areas of the body during the last 12 months. The least prevalence occurs among age group of 21-30 years (55.6%), although more than half of them are affected by WMSDs. Personal interview conducted with these age group showed that most of them participate in sport activities which help to relieve their symptoms[19].

The high prevalence may be due to the fact blacksmiths are constantly engaged in highly repetitive hand rigorous and intensive jobs for long time and several years. Thus, the most common risk factor were high repetitive motion and prolong sitting, and the most commonly affected age group was 61-70 years, also shoulder joint was the most common affected region. These affect their health, productivity, and overall work performance.

In terms of body part, site most commonly affected was shoulder region in 42.9% 0f cases this is dissimilar with the study conducted in which low back is the most frequent point of affectation, nevertheless this might be due to high repetitive hammering[19]. The least commonly affected areas are elbow and knees, with no affectation at ankle joint. The second most frequent point of affection was low back (25.3%) this might due to prolong sitting with awkward posture adoption.

Also from the outcome of this study, the pattern of WMSDs varies with many variables. For instance, it has been shown that 87.5% of overweight participants experienced more than one type of pain or discomfort in different body parts, this may be due to decrease activity and difficulty in adopting right posture due to their body heaviness. Moreover, there is no much variation of WMSDs in terms of marital status of the participants except that most low back and hip disorders occurred in the married participants (71.8% & 60%) respectively.

Blacksmiths working at Kurmi market are associated with various risk factors, the finding of this study showed that 34.6% of the participants work for 5-8 hours per day. Also greater percentages, 30.8% & 26.3% work for six and seven days of the week respectively. This may account for high prevalence of WMSDs among them because high work pace is a potential risk factor for developing WMSDs. Nature of work is another strong risk factor for developing WMSDs among blacksmiths of Kurmi market, the work nature of 85.7% of the participants was repetitive hammering with force application. An activity is said to be repetitive if 50% of the work cycle involves similar motion pattern[20]. The high repetitiveness may be regarded as a causative factor for the development of high WMSDs in the upper limb; while for the remaining 14.3%, their work nature was vibratory[21].

Work related musculoskeletal disorders are associated with many cost implications. In this study, sick leave (absent from work) is one of the cost implication among the study population, in which 7 of the participants absents themselves from work as a result of their symptoms, 2 of them were absent due to neck pain, 2 due to neck & shoulder pains and 1 for each of shoulder & low back, low back and low back & hip[20-37].

5. CONCLUSION

There is high a prevalence of WMSDs among blacksmiths in kano. The upper extremity region of the body is more affected than lower extremities. Increasing age, weight and working for long hours or days were major risk factors to developing WMSDs.

Recommendations

Based on the results obtained in this study, the recommendations made are as follows:

1. Physiotherapists, specifically community Physiotherapists and other members of health care team should work toward prevention and educating the blacksmiths on certain preventive measures of developing WMSDs including proper ergonomics and avoiding risk factors.
2. Blacksmiths should avoid working for long hours and many/all days of the week.
3. Blacksmiths should be educated on how to protect their upper limbs by providing them or making them aware of the upper limb protective wears.

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