

## Prevalence, Pattern and Impact of Work-related Musculoskeletal Disorders on Functional Performance of Welders in a Nigeria Rural-Urban Center

Gbiri CA, PhD<sup>1\*</sup>, Osho AO, PhD<sup>1</sup>, Olumiji A, BPT<sup>2</sup>

1- Lecturer, Department of Physiotherapy, College of Medicine, University of Lagos, Idi-Araba, Lagos, Nigeria.

2- Physiotherapist, Department of Physiotherapy, College of Medicine, University of Lagos, Idi-Araba, Lagos, Nigeria.

### Abstract

Received: April 2012, Accepted: September 2012

**Background:** The impact of Work-Related Musculoskeletal Disorders (WRMSDs) on functional performance of Nigerian Welders is unknown. This study investigated the prevalence, pattern and impact of WRMSDs on functional efficiency among Welders in Alimosho Local Government, Lagos State, Nigeria.

**Materials and Methods:** This cross sectional survey involved 177 Welders in a rural-urban area in Nigeria between January and July, 2011. The Modified Maastricht musculoskeletal questionnaire was used for the study. The questionnaire was modified in content and was also culturally adapted. Descriptive statistics methods were used to summarize the data. Chi-square test was used to find the impact of WMSDs on functional performance.

**Results:** The mean age of participants was 36.46±10.02 years with working experience of 14.31±9.93 years. Majority of the participants (52.5%) found their job physically exhaustive and were always lifting heavy objects at work. Most (98%) had WRMSDs with 87.5% having their job affected. Low back pain was the most common WRMSDs occurring in 60.1% of the cases. WRMSDs had caused 26.2% of respondents to lose their jobs, while 7.4% of them changed their jobs.

**Conclusions:** There is high prevalence of WRMSDs among Welders. Low back pains followed by neck and shoulder pains were the most prevalent WRMSDs among Nigerian Welders in rural-urban areas. WRMSDs have negative impact on job performance, leisure activities and family roles among Nigeria Welders in the study areas.

**Keywords:** musculoskeletal, disorders, prevalence, Nigeria

### Introduction

Work-Related Musculoskeletal Disorders (WRMSDs) is an umbrella term for conditions thought to be caused by exposures in the workplace [1]. It is often referred to as overuse syndrome, repetitive strain injury or cumulative trauma disorder [2]. It is a significant contemporary occupational health problem estimated to affect millions of workers around the world annually [3]. WRMSDs are an important cause of morbidity and disability in many occupational populations [4]. It is prevalent

among people who perform repetitive jobs and constitutes major health problems in industrial Countries [5-8].

The increased volume of WRMSDs and injuries and their profound economic impact in the workplace have led to studies aimed at identifying the essential risk factors and to establish sound intervention strategies [9]. Previous studies have revealed that WRMSDs among Welders are caused,

\* **Corresponding author:** Caleb Ademola Gbiri, Department of Physiotherapy, College of Medicine, University of Lagos, Idi-Araba, Lagos, Nigeria. E-mail : calebgbiri@yahoo.com

aggravated or precipitated through their need to exert undesirable force, use uncomfortable hand grips, or adopt static awkward postures in the workplace coupled with continuous repetitive work and insufficient rest or recovery among workers [1, 6, 10].

The return to the workplace of individuals affected by WRMSDs represents a critical problem in work settings that feature a multitude of tasks which are liable to biomechanical strain of the body [11-14]. Therefore, WRMSDs are precipitated by increased muscle tension, heightened awareness of normal or increased sensory nerve input, and anxiety driven introspection. This disorder has both physical and psychological causes [15-19].

The origins of WRMSDs are assumed to be multifactorial, with the implication that several risk factors can contribute to its development. Evidence shows that neck flexion and sitting are physical risk factors for neck pain among welders, whereas high quantitative job demands, low authority over decisions, low skill discretion, and poor social support by colleagues are important work-related psychosocial risk factors among them [20-21]. However, topographic distribution of WRMSDs among professional welders is still unclear. Although the input of WRMSDs on functional performance of welders has not been well documented, it has been opined that physical work factors may or may not be associated with prognosis in WRMSDs [22-23].

Therefore, there is need for a study on prevalence, pattern and input of WRMSDs on functional performance in various occupational groups. This study investigated the prevalence, pattern and impact of WRMSDs on functional efficiency among welders in a rural-urban setting in Nigeria.

## Materials and Methods

This cross sectional survey involved 177 Welders in a rural-urban area in Nigeria between January and July, 2011. This research was approved by the research ethics committee of the Lagos University Teaching Hospital, Lagos, Nigeria. The informed consent from the participants was obtained before participating in the study. A total of 177 Welders in Alimosho Local Government Area of Lagos State, Nigeria participated in this study. Respondents were systematically selected from a registry list of the register of their professional association. Those who had less than one year working experience were excluded. The instrument used for this study was a questionnaire adopted from Maastricht musculoskeletal questionnaire [6]. The Maastricht musculoskeletal questionnaire was modified to include some items on functional performance and other items that are specific to a job like welding. The questionnaire was divided into four sections (A to D). Section A comprised of socio-demographic data and job history. Section B comprised of information on body posture, job demand, work environment, and level of social interaction. Section C comprised of information on prevalence, pattern, and causes of musculoskeletal pain, while section D comprised of information on effect of musculoskeletal pain on job performance, leisure and family role. A total of 62 questions made up the questionnaire. The items in the questionnaire were designed using the responses from the participants in the Maastricht upper extremity questionnaire. The questionnaire was then distributed to 10 Physiotherapists, 2 Biostatistician, 2 Occupational Therapists, and 2 Orthopedic surgeons for content validity. The suggested corrections were made and the revised questionnaire was administered to 30 welders

in Lagos other than the intended research area for measuring test-retest reliability ( $r=0.92$ ). Participants were selected through the authorities of the Welders' Association. We adopted to recruit them through this authorities as it is mandatory for every member to attend at least a meeting within a month. The permission of the authorities of the association was obtained as well as the written informed consent of each participant. The researcher attended all weekly meetings of the association where the questionnaires were distributed to the participant. Each participant completed and returned the questionnaire within the meeting periods. Descriptive statistics methods including mean, standard deviation and percentage were used to summarize the data. Chi-square test was used to find the impact of WMSDs on functional performance.

**Results**

This study involved 177 (all male) welders in Alimosho Local Government Area of Lagos State. Their age ranged between 20-61 years with a mean of  $36.46 \pm 10.02$  years. One hundred and thirty-six (76.8%) participants were married, 34 (19.2%) were single while 7 (4%) were divorced. One hundred and twelve (63.6%) participants had primary education while only one (0.6%) had university education. Eighty-seven (49.7%) were supervisors at work, 62 (35.4%) were labourer, while 21 (12%) were join men. The years of working experience ranged between 1-42 years, with a mean  $14.31 \pm 9.93$  years and mode of 4 years. Their average working hours per day ranged between 5-12 hours with mean of  $7.31 \pm 1.40$  (Table 1). Most participants, (78, 44.1%), worked best bending from the back, while 31 (17.5%) worked best standing upright (Figure 1). Forty-three participants reported (24.3%) always keeping their back straight at work,

while six of them (3.4%) never maintain straight back at work. Sixty-five (36.7%) of participants always bent for long hours in one position, while six (3.4%) declared that never having to bend their backs for long time.

**Table 1: Some socio-demographic characteristics of the participants**

Variables	Frequency (n)	Percentage (n)
Age Group		
- 20-29	49	27.7
- 30-39	67	37.9
- 40-49	37	20.9
- 50-59	18	10.2
- 60 and above	6	3.4
Educational qualification		
- Non-formal	34	19.4
- Primary	112	63.6
- Secondary	21	11.9
- Technical	4	2.3
- Polytechnic	4	2.3
- University	1	0.6
Level of work involvement		
- Apprentice	5	2.9
- Join man	21	12
- Labourer	62	35.4
- Supervisor	87	49.7
Marital Status		
- Single	34	19.0
- Married	136	77.0
- Divorced	7	4.0



**Figure 1: Distribution of participants based on their work posture**

More than half (52.5%), always lifted heavy objects at work while few (2.8%) never lifted heavy objects at work. More than 38% of participants were used to work up to two hours at a level higher than their shoulder while about 14% (n=25) never work two hours at a level higher than their shoulder at work. Thirty five percent always sit in awkward postures at work while few of them (4%) never sit in an awkward posture at work. About 52% always found their job physically exhausting, while only three (1.7%) welders never found their job physically exhausting (Table 2).

Sixty-seven (38.1%) always worked under extensive pressure while nine (5.1%) never worked under extensive pressure. Majority (65.5%) always found their co-workers friendly while a few (0.6%) never found them friendly. Eighty (45.7%) always took extra hours to finish their jobs while five (2.9%) never required extra

hours to finish their jobs. Seventy-one (40.1%) always found their work task difficult, while two (1.1%) always found it easy. Eighty-four (47.5%) participants always found their work environment "good" while only two (1.1%) never found their work environment "good". One-hundred and thirty (73.4%) were always exposed to welding arc light while five (2.8%) were seldom exposed to welding arc light. Twenty-seven (15.3%) participants always worked for a long time without resting while sixty-one (34.5%) never worked for a long time without resting. Forty-eight (27.1%) always found it difficult to concentrate on their jobs, and twenty (11.3%) never found it difficult to concentrate on their jobs. One-hundred and one (57.1%) participants always worked beyond their normal working hours daily, and only two (1.1%) never worked beyond the normal working hours (Table 2).

**Table 2: Participant's distribution based on their answer to some items about their job**

Variables	Always		Often		Sometimes		Seldom		Never	
	N	%	N	%	N	%	N	%	N	%
During my work I keep my back straight	43	24.3	23	13	76	42.9	29	16.4	6	3.4
At work I bend for long hours in one position	65	36.7	48	27.1	46	26	12	6.8	6	3.4
For more than two hours per day I work above my shoulders	26	14.7	28	15.8	68	38.4	30	16.9	25	14.1
I lift heavy objects at work	93	52.5	36	20.3	37	20.9	6	3.4	5	2.8
In work I perform repetitive task	79	44.6	38	21.5	49	27.7	6	3.4	5	2.8
I find my work physically exhausting	93	52.5	36	20.3	41	23.2	4	2.3	3	1.7
I work under extensive work pressure	67	38.1	33	18.8	56	31.8	11	6.3	9	5.1
I find it difficult to finish my task	33	18.6	54	30.5	84	47.5	2	1.1	4	2.3
I take extra hours to finish my job task	80	45.7	41	23.4	48	27.4	1	0.6	5	2.9
I have not enough time to finish my job task	65	36.7	38	21.5	65	36.7	5	2.8	4	2.3
I find my work task difficult	71	40.1	31	17.5	60	33.9	13	7.3	2	1.1
I can work for a long time without taking a rest	27	15.3	19	10.7	43	24.3	27	15.3	61	34.5
I find it difficult concentrating	48	27.1	28	15.8	-	28	10	5.6	20	11.3
I work beyond my normal working hour daily	101	57.1	26	14.7	-	26	1	0.6	2	1.1
During my work I sit in an awkward posture	62	35	51	28.8	48	27.1	9	5.1	7	4

A total of 126 (71.2%) participants did not have musculoskeletal complaints at that time, while 51 (28.8%) of them had musculoskeletal complaints. Also, 55 (31.1%) did not have musculoskeletal complaints within the last 12 months, while 122 (68.6%) participants had complaints. Among them, 105 (87.5%) of the musculoskeletal complaints were caused by job activities, five (4.2%) of the participant did not know the cause, eight of them (6.7%) stated that it was caused by accident outside the work, and two (1.7%) stated that it had been caused by accident at work (Table 3). Respondents who reported musculoskeletal problems at some stage during their work were asked to choose specific areas and were asked if the pain disappeared after a short rest or not. Forty-six (38%) had neck pain and forty-eight (39.3%) had shoulder pain. Upper arm pain was reported by 25 (20.5%), elbow pain and lower back pain was reported among 9(7.3%) and 49 (60.2%), respectively. The number of participants who had complained during the past one year were 116 (96.7%). Duration that they were not able to perform their job due to musculoskeletal problems ranged between 1-14 days. About 41% of injured participants had been treated by a physician (n=50).

**Table3: Prevalence and causes of musculoskeletal disorder in participants**

Variables	n	%
Prevalence		
- Musculoskeletal complain now (no)	126	71.2
- Musculoskeletal complain now (yes)	51	28.8
- Musculoskeletal complain i last 12month (no)	55	31.1
- Musculoskeletal complain i last 12month (yes)	122	68.9
Cause of complain		
- My job activities	105	87.5
- I don't know	5	4.2
- Accident outside work	8	6.7
- Accident at work	2	1.7

Twenty-three (19.4%) had received education on how to prevent musculoskeletal pain of which only 5 (21.7%) studied it. Seventeen participants (73.9%) were educated by a physician. One hundred and eleven (91.7%) people had received treatment for complains, of which 37 (32.7%) used medication, 3 (2.7%) had operation, 54 (47.8%) used self-medication while 19 (16.8%) preferred traditional remedies. Thirty-two (26.2%) had lost a job before, nine (7.4%) had changed their job and work efficiency of seventy-eight (63.9%) was reduced. Twenty of them (16.4%) could no longer do their work during the past of year. Forty-two (34.4%) could not work, 67 (54.9%) participant's activities were hindered in their functional performance at work and in 44 (36.1%) their leisure activities were hindered, in 45 of them (37.2%) social relationship with other people were hindered, 34 (28.1%) sexual activities were hindered and 24 (19.7%) religious activities were hindered. Work-related musculoskeletal disorders had significant negative effect on functional performances, family role and leisure activities of the participants.

### Discussion

The purpose of this study was to investigate work-related musculoskeletal problems experienced by welders in rural-urban settings in Lagos State and to find the effect of work-related musculoskeletal disorders on their functional performance. Our study shows a high prevalence (97.7%) of WRMSDs among welders. This shows a need for public awareness on the prevention of occurrence of musculoskeletal disorders not only among welders but also for other similar occupational groups in Nigeria. This result is in agreement with previous findings that reported high prevalence of

musculoskeletal disorders in industrial workers and across the occupational groups [24-35]. However, the prevalence in this study is higher than the previous one reported in Nigeria with upper limit of 63.9% [36] (Tella *et al* 2009). It is also higher than a similar study among the same occupational group in United Kingdom with a prevalence rate of 80% [37].

The fact that low back problems occurred most frequently among the participants could be attributed to their work postures, as most of them either being in awkward posture or working with their back bent continually at work. This result corroborates with previous findings that reported the body area most frequently affected by WRMSDs is the lower back [6, 37]. In this study, it was observed that neck and shoulder disorders next to low back pain may be due to the fact that large percentages of the participants work with their lifted hand and extended neck. These prevalent disorders have also been previously reported among welders in the United Kingdom [6, 37]. The 12-month prevalence value for presence of musculoskeletal disorder (68.9%) was higher than the prevalence, (50%), that was reported by Leboeuf *et. al* [38]. in the Nordic population, but lower than that (73%) in the United Kingdom [6, 37].

The result indicates that musculoskeletal disorders have significant impact on job performance including leisure activities and family role and it has caused some welders to either reduce their work involvement or change their job. Effort should be directed at preventive aspects to stem down musculoskeletal disorders among the artisans to reduce dependency in activities of daily living. There should be focus on early recognition and intervention when there is occurrence of musculoskeletal disorders. This finding corroborates with that of

Hoogendoorn *et al* [35], who reported that low back pain, in addition to being particularly prevalent was also more likely to result in reduced job performance (work efficiency), leisure activity, longer duration of work incapacity, and greater use of healthcare resources (e.g. medical consultations). The findings of this study are consistent with literature that identifies lower back pain as a major cause of losing work time and incapacity in the working population [23-34]. The negative impact of WRMSDs on leisure activity and family role agrees with previous studies by those who have reported similar impacts [38].

## Conclusion

From the outcome of this study, it was concluded that there is high prevalence of musculoskeletal disorder among welders in a rural-urban setting of Alimosho Local Government Area of Lagos State. The most common WRMSDs among Nigeria Welders in rural-urban areas are low back pain followed by neck and shoulder pain. Musculoskeletal disorders have negative impact on job performance, leisure activities and family roles among Nigerian welders working in a rural-urban centre.

## Acknowledgement

Authors thanks all people who helped with this survey.

**Conflict of interest:** Non declared

## References

1. Swift MB, Cole DC. Beaton DE, Manno M. Health care utilization & workplace interventions for neck and upper limb problems among new paper workers. *J Occup Environ Med* 2001; 43(3): 265-75.

2. Power C, Frank J, Hertzman C, Schierhout G, Li L. Predictors of low back pain in a prospective British study. *Am J Public Health*. 2001; 91(10):1671-8.
3. Chiang HC, Ko YC, Chen SS, Yu HS, Wu TN & Chang PY. Prevalence of shoulder and upper-limb disorders among workers in the fish processing industry. *Scand J Work Environ Health*: 1993; 19(2):126-31.
4. Piirainen, H, Rasanen K, Kivimaki M. Organizational climate, perceived work-related symptoms and sickness absence: a population-based survey. *J Occup Environ Med*. 2003; 45(2): 175-84.
5. Gerr F, Letz, R, Landrigan, PJ. Upper-extremity musculoskeletal disorders of occupational origin. *Annu Rev Public Health* 1991;12:543-66.
6. Herberts, P & Kadefors, R. A study of painful shoulders in welders. *Acta Orthop Scand*. 1976; 47(4):381-7
7. Holmström EB, Lindell J, Moritz U. Low back and neck-shoulder pain in construction workers: occupational workload and psychological risk factors. Part 1: Relationship to low back pain. *Spine* 1992;17(6):663-71
8. Feuerstein M, Huang GD, Haufler AJ & Miller JK. Development of a screen for predicting clinical outcomes in patients with work-related upper extremity disorders. *J Occup Environ Med* 2000;42(7):749-61.
9. Kuijpers T, van der Windt DA, van der Heijden GJ & Bouter LM. Systematic review of prognostic cohort studies on shoulder disorders. *Pain* 2004; 109(3):420-31.
10. Burdorf A, Naaktgeboren B, Post W. Prognostic factors for musculoskeletal sickness absence and return to work among welders and metal workers. *Occup Environ Med* 1998; 55(7):490-5.
11. Leclerc A, Landre MF, Chastang JF, Niedhammer I, Roguelau Y, Study Group on Repetitive Work. Upper-limb disorders in repetitive work. *Scand J Work Environ Health* 2001; 27(4):268-78.
12. Morken T, Riise T, Moen B, Bergum O, Hauge SH, Holien S & et al. Frequent musculoskeletal symptoms and reduced health-related quality of life among industrial workers. *Occup Med*. 2002; 52(2): 91-8.
13. Riihimäki H. Hands up or back to work—future challenges in epidemiologic research on musculoskeletal diseases. *Scand J Work Environ Health* 1995; 21(6):401-3.
14. Pincus T, Burton AK, Vogel S & Field AP. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. *Spine*. 2002; 27(5): E109-20.
15. Shipley M. ABC of rheumatology. Pain in the hand and wrist. *BMJ* 1995: 310(6974):239-43.
16. Tsai SP, Gilstrap EL, Cowles SR, Waddell LC Jr, Ross CE. Personal and job characteristics of musculoskeletal injuries in an industrial population. *J Occup Med* 1992;34(6):606-12
17. Uthoff HK, Sarkar K. Shoulder pain and reflex sympathetic dystrophy. *Curr Opin Rheumatol* 1991; 3(2):240-6.
18. Van der Windt DA, Thomas E, Pope DP, de Winter AF, Macfarlane GJ, Bouter LM & et al. Occupational risk factors for shoulder pain: a systematic review. *Occup Environ Med*. 2000 57(7):433-442.
19. Vecchio P, Kavanagh R, Hazleman BL, King RH. Shoulder pain in a community-based rheumatology clinic. *Br J Rheumatol* 1995;34(5):440-2.
20. Ariëns GA, van Mechelen W, Bongers PM, Bouter LM, Van der Wal G.. Physical risk factors for neck pain. *Scand J Work Environ Health* 2000; 26(1):7-19.
21. Cassou B, Derriennic F, Monfort C, Norton J, Touranchet A. Chronic neck and shoulder pain, age, and working conditions: longitudinal results from a large random sample in France. *Occup Environ Med* 2002; 59(8):537-44.
22. Cole DC, Hudak PL. Prognosis of nonspecific work-related musculoskeletal disorders of the neck and upper extremity. *Am J Ind Med* 1996; 29(6):657-68.
23. Lassen CF, Mikkelsen S, Kryger AI, Andersen JH. Risk factors for persistent elbow forearm and hand pain among computer workers. *Scand J Work Environ Health* 2005; 31(2):122-31.
24. Joksimovic, L., Starke, D., v d Knesebeck, O & Siegrist, J. Perceived work stress, overcommitment, and self-reported musculoskeletal pain: a cross-sectional investigation. *Int J Behav Med* 2002; 9(2), 122-38.
25. Kuijpers T, van der Windt DA, van der Heijden GJ, Bouter LM.. Systematic review

- of prognostic cohort studies on shoulder disorders. *Pain* 2004; 109:420–31.
26. Lavender SA, Oleske DM, Nicholson L, Andersson GB, Hahn J. Comparison of five methods used to determine low back disorder risk in a manufacturing environment. *Spine* 1999; 24(14):1441-8.
  27. Lotters F, Burdorf A. Prognostic factors for duration of sickness absence due to musculoskeletal disorders. *Clin J Pain* 2006; 22(2):212–21.
  28. Matoba T, Ishitake T, Kihara T. A new criterion proposed for the diagnosis of hand-arm vibration syndrome. *Cent Eur J Public Health* 1995; 3 suppl: 37–9.
  29. Moore JS, Garg A. Upper extremity disorders in a pork processing plant: relationships between job risk factors and morbidity. *Am Ind Hyg Assoc J* 1994; 55(8):703-715:
  30. Naliboff BD, Cohen MJ, Swanson GA, Bonebakker AD & McArthur DL. Comprehensive assessment of chronic low back pain patients and controls; physical abilities, level of activity, psychological adjustment and pain perception. *Pain* 1985; 23(2):121-34.
  31. Torp S, Riise T, Moen BE. How the psychosocial work environment of motor vehicle mechanics may influence coping with musculoskeletal symptoms. *Work Stress* 1999; 13:193–203.
  32. Eriksen W, Natvig B, Knardahi S, Bruusgaard D. Job characteristics as predictors of neck pain. A 4-year prospective study. *J Occup Environ Med.* 1999; 41(10): 893-902.
  33. Fletcher B, Jones F. A refutation of Karasek's demand-discretion model of occupational stress with a range of dependent measures. *J Organ Behav* 1993; 14:319–330.
  34. Ganster DC, Schaubroeck J. Work stress and employee health. *J Manage* 1991; 17:235–271.
  35. Hoogendoorn WE, Van Poppel MN, Bongers PM, Koes BW & Bouter LM. Physical load during work and leisure time as risk factors for back pain. *Scand J Work Environ Health* 1999;25(5):387-403.
  36. Tella BA, Akodu AK, Fasuba OO. The prevalence of neck and upper extremity repetitive stress injury among bank workers in Lagos, Nigeria. *The Internet Journal of Rheumatology* 2011; 6(2), DOI:10.5580/2900.
  37. Friedrich, M., Cermak, T., & Heiller, I. Spinal troubles in sewage workers: Epidemiological data and work disability due to low back pain. *Int Arch Occup Environ Health*, 2000; 73(4), 245-54.
  38. Elders LA & Burdorf A. Workplace intervention. *Occup Environ Med* 2004; 61(4):287-8.