Title: Work-related musculoskeletal disorders in highway sanitary workers

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Abstract

Background: Highway sanitary workers are exposed to various health hazards in the course of duty. This study investigated the prevalence of work-related musculoskeletal disorders (WMSDs) among highway sanitary workers in Lagos Waste Management Authority (LAWMA), Lagos, Nigeria.

Method: Two hundred fifty highway sanitary workers (46 males and 204 females) of LAWMA selected from four Local Government Areas of Lagos State, Nigeria completed a 26-item questionnaire that collected information on WMSDs.

Results: The 12-month prevalence of WMSDs among the workers was 24.8%. The most commonly affected body part was the lower back (22.0%). Thirty-seven (59.7%) of the respondents reported gradual onset of musculoskeletal disorders (MSDs) while 25 (40.3%) reported sudden onset. The mean years of working experience was 3.22 $\pm$ 0.23 years with 111 (44.4%) of the respondents having worked for 4 years and 7 (2.8%) having worked for 1year. The three major job risk factors identified were: continuing to work when injured (87.2%), working in the same position for long periods (53.6%) and lifting heavy materials (52.4%). Pearson's Product Moment Correlation Coefficient analysis showed that there were significant relationships between prevalence of WMSDs and age ($r = 0.42$, $p = 0.001$*) and years on the job ($r = 0.17$, $p = 0.01$*).

Conclusion: There was a low prevalence of WMSDs among highway sanitary workers of LAWMA. The most commonly affected body part was the lower back. Increasing age and years of working experience are significant factors that can contribute to the development of WMSDs among these workers.

Key Words: Work; musculoskeletal disorders; highway; sanitary workers.

Introduction

Work-related musculoskeletal disorders (WMSDs) are musculoskeletal disorders (MSDs) that result from a work-related event. MSDs include a wide range of inflammatory and degenerative conditions affecting the muscle, tendon, ligament, joint, peripheral nerve, and supporting blood vessels (Punnet and Wegman, 2004). They represent one of the leading causes of occupational injury and disability in both developed and developing countries (World Health Organization, 1985). Body regions most commonly involved are the lower back, neck, shoulder, forearm, and hand, although recently the lower extremity has received more attention (Punnet and Wegman, 2004).

In many countries, the prevention of MSDs among the work force is considered a national priority (Spielhoiz, et al., 2001). Several studies have demonstrated a relationship between certain jobs and risk factors that are associated with increased risks of developing MSDs (Bernard, 1997; Spielhoiz, et al., 2001; da Costa and Vieira, 2010). Psychosocial factors such as high job demands, low social (coworker) support, low job control, high and low skill discretion and low job satisfaction have been implicated as risk factors for MSDs (Ariëns, et al., 2001). Awkward working postures, repetitive use of body segments, previous or existing injuries, long periods of standing, genetic makeup of the individual and demographic factors are known to be important predictive variables of MSDs (Kivi and Mattila, 1991; Mani and Gerr, 2000; Occupational Safety and Health Administration (OSHA), 2000; Fenske and Simcox, 2003). Manual material handling such as lifting and lowering materials has been recognized as a cause of musculoskeletal injuries at work places (Waters, Putz-Anderson, and Garg *et al*, 1994; Dempsey, 2003). Poor postural working conditions and the absence of effective work injury prevention programs have resulted in a very high rate of MSDs as well (Bernard, 1997).

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In industrially developing countries like Nigeria, the problem of work place injuries are extremely serious (Dempsey, 2003). The 12-month prevalence of WMSDs among Nigerian physiotherapists was 91.3%, and the lower back was the most commonly affected body part. Treating large numbers of patients in a day was cited by most of the respondents as the most important work factor for their WMSDs (Adegoke, Akodu and Oyeyemi, 2008). Tinubu *et al* (2010) reported that 84.4% of nurses have had WMSDs once or more in their occupational lives. The 12-month period and point prevalence rate of WMSDs among these nurses for any region was 78% and 66.1%, respectively. WMSDs occurred mostly in the lower back. Working in the same positions for long periods, lifting or transferring dependent patients and treating an excessive number of patients in one day were the most perceived job risk factors for WMSDs (Tinubu, et al., 2010). Another study reported that 61.3% of the sampled Solid Waste Collectors in Port Harcourt municipality, Nigeria suffered from musculoskeletal injuries on their job because of the large volume of wastes they have to pack manually in contrast to the use of hydraulic lifts (Inyang, 2007). In India, Friedrich, Cermak, and Heiller, et al., (2000) reported that the 12-month prevalence rates of neck, upper back and lower back pain were 52.4%, 54.8% and 72.8%, respectively, among sewage and sanitary workers. Abou-ElWafa, et al., (2012) observed that the percentage of musculoskeletal complaints of Municipal Solid Waste collectors in Egypt during a 12-month period was as high as 60.8%. Highway waste management practice in Lagos State, Nigeria has largely focused on the issues of cleaning, collection and disposal of wastes using menial tools such as brooms, rakes, and shovels, which are less costly than the mechanized cleaning and collection systems adopted in developed countries. Little is known of the impact of the job on the health status of the workers. This study therefore investigated the prevalence of WMSDs among the highway sanitary workers in Lagos Waste Management Authority (LAWMA), Lagos State, Nigeria.

Methods

Participants

A total of two hundred fifty (250) highway workers with a minimum of 6 months of working experience from LAWMA in Mushin, Surulere, Shomolu and Ikeja Local Government Areas of Lagos State, Nigeria participated in the study. They were selected using a non-probability consecutive sampling technique, meaning that the subjects were recruited purposefully as they became available and were not randomized. Ethical approval was obtained from the Health Research and Ethics Committee of the Lagos University Teaching Hospital, Idi-Araba, Lagos. Informed consent was obtained from the management of LAWMA and the subjects who participated in the study. Each subject completed a structured 26-item questionnaire.

Questionnaire design

This modified questionnaire titled 'Prevalence of Musculoskeletal Disorders Questionnaire' was adopted from a previous study, 'Standardized Nordic Questionnaires for the Analysis of Musculoskeletal Symptoms," by Kuorinka, et al., (1987) and has been validated for content validity. It has seven sections. Section A (items 1-5) collected information on the demographic data of the subjects. Section B (items 6–10) collected information on their working experience. Section C (items 11–13) collected information on work postures. Section D (items 14-22) collected information on musculoskeletal injuries. Section E (items 23-24) collected information on the effects of WMSDs on job performance. Section F (item 25) collected information on risk factors to WMSDs, and Section G (item 26) collected information on coping strategies adopted by the subjects.

Administration of questionnaires

The aims and objectives of the study were clearly stated to all the subjects, and they were assured of the confidentiality of their responses. The working postures of the subjects were observed after which copies of the questionnaire were distributed to them. This was important so as to determine if the working postures predisposed them to MSDs. Those who were literate completed the questionnaires themselves while illiterate subjects were assisted in completing the questionnaires by the researchers. The collection of the completed questionnaires was done immediately by hand.

Data analysis

Descriptive statistics of mean, standard deviation, frequency and percentages were used to summarize data. Pearson's Product Moment Correlation Coefficient was used to determine the relationship between prevalence of WMSDs and age, years of working experience and hours spent standing at work, respectively. The results are presented using tables and bar charts. The level of significance was set at $p < 0.05$.

Results

A total of 250 copies of the questionnaire were distributed, and all copies were returned, giving a response rate of 100%. The mean age and mean years of working experience were 39.01 $\pm$ 9.02 and 3.22 $\pm$ 0.23, respectively. Fifty (20%) of the respondents ranged in age from 40 to 44 years while only 1 (0.4%) was 60 years and above (Figure 1).

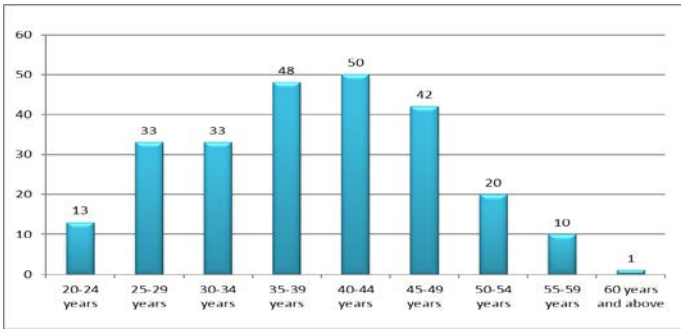


Figure 1: Age distribution of respondents

Table 1: Years of working experience of respondents

Year(s)	Frequency (n)	Percentage (%)
1.0	7	2.8
1.5	4	1.6
2.0	34	13.6
2.5	5	2.0
3.0	86	34.4
3.5	3	1.2
4.0	111	44.4
Total	250	100

One hundred eleven (44.4%) of the respondents had worked for 4 years while 7 (2.8%) had worked for 1 year (Table 1).

Table 2: Experience of WMSDs

Variables	Frequency (n)	Percentage (%)
Discomfort in the last 12 months		
Yes	62	24.8
No	186	74.4
No response	2	0.8
Total	250	100.0
WMSD symptoms during the time of study		
Yes	43	17.2
No	18	7.2
No response	189	75.6
Total	250	100.0
Onset of discomfort		
Gradual	37	59.7
Sudden	25	40.3
Total	62	100.0
Discomfort caused by professional task		
Yes	61	98.4
No	1	1.6
Total	62	100.0

Sixty-two (24.8%) of the respondents had discomfort in the last 12 months while 186 (74.4%) had no discomfort. Forty-three (17.2%) of the respondents experienced WMSD symptoms during the time of the study, while 18 (7.2%) had no symptoms. Thirty-seven (59.7%) of the respondents reported gradual onset of MSDs while 25 (40.3%) reported sudden onset. Sixty-one (98.4%) of the respondents experienced discomfort due to the professional tasks while one (1.6%) did not have discomfort from the tasks (Table 2).

Twenty (32.3%) of the respondents who had WMSDs had onset at the age range of 51 years and above while only one (1.6%) had onset at the age range of 20-25 and 26-30 years, respectively (Figure 2). The most prone sites of WMSDs were the lower back with 55 (22.0%) respondents having lower back pain. The elbow and thumb were the least prone sites of affectation, with no respondents experiencing pain in those regions. It is worthy to note that some respondents reported multiple sites of discomfort while others had a single site of discomfort (Figure 3).

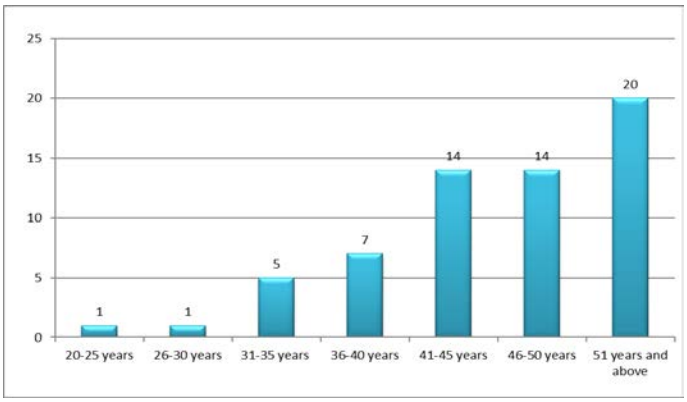
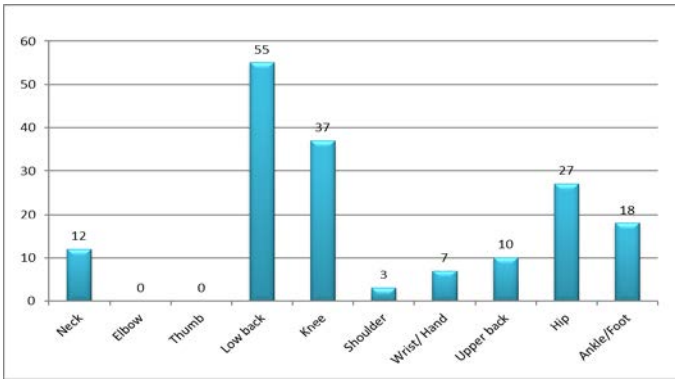


Figure 2: Age of onset of WMSDs



Figures 3: Body sites affected by WMSDs

Twenty-nine (46.8%) of the respondents treated the symptoms by themselves while four (6.4%) ignored the symptoms. Fifty (80.6%) respondents reported that WMSDs had effects on their job performance while 12 (19.4%) reported that they had no effect on their job performance. Thirty-four (54.8%) of the respondents reported that their work did not aggravate their existing injuries while 28 (45.2%) reported that their work aggravated their existing injuries (Table 3).

Table 3: Treatment options, effects of WMSDs on job performance and vice versa

Variables	Frequency (n)	Percentage (%)
Response to symptoms		
Self-medication	29	46.8
Visited the clinic	29	46.8
Was admitted	0	0.0
Ignored the symptom	4	6.4
Total	62	100.0
WMSDs affected efficiency of job		
Yes	50	80.6
No	12	19.4
Total	62	100.0
Work aggravated an existing injury		
Yes	28	45.2
No	34	54.8
Total	62	100.0

The most frequently adopted posture by respondents for one hour and above was standing. This was followed by neck bending and bending at the waist (Table 4).

Table 4: Work posture of participants

Postures	Frequency (n)		Percentage (%)
Standing			
<1	1		0.4
1	19		7.6
2	136	249	54.4
3	92		36.8
4	2		0.8
Total	250		100.0
Sitting			
<1	44		17.6
1	30		12.0
2	1	31	0.4
No response	179		70.0
Total	250		100.0
Bending at the neck			
<1	77		30.8
1	144		57.6
2	21	165	8.4
No response	8		3.2
Total	250		100.0
Bending at the waist			
<1	91		36.4
1	98		39.2
2	58	157	23.2
3	1		0.4
No response	2		0.8
Total	250		100.0

Fourteen (5.6%) of the respondents have had a break in career (a protracted time off work) while 236 (94.4%) have had no break. No respondents experienced more than a one-year break while 14 (5.6%) experienced less than a one-year break in career. Nine (3.6%) of the respondents' reason for the break was due to body pain, and 5 (2%) of the respondents' reason for break was due to discomfort from MSDs (Table 5).

Table 5: Break taking in respondent's

Variable	Frequency (n)	Percentage (%)
Respondents who had break in career		
Yes	14	5.6
No	236	94.4
Total	250	100.0
The period for the respondents' break		
More than one year	0	0.00
Less than one year	14	5.6
No response	236	94.4
Total	250	100.0
Reasons for taking breaks		
Study leave	0	0.0
Body pain	9	3.6
Discomforts from MSDs	5	2.0
No response	234	94.4
Total	250	100.0

The four major job risk factors identified by respondents were: continuing to work when injured, working in the same position for long periods of time, lifting or moving heavy materials or equipment and performing the same task over and over (Table 6).

Table 6: Risk factors for WMSDS

Variables	Irrelevant	In a minor way	Moderately	Severely
Performing the task over and over	0 (0.0%)	14 (5.6%)	184 (73.6%)	52 (20.8%)
Performing a lot of procedures in a day	0 (0.0%)	10 (4.0%)	191 (76.4%)	49 (19.6%)
Not enough rest breaks during the day	3 (1.2%)	56 (22.4%)	169 (67.6%)	22 (8.8%)
Working in the same position for long periods	0 (0.0%)	5 (2.0%)	111 (44.4%)	134 (53.6%)
Reaching and working away from your body	17 (6.7%)	201 (80.4%)	30 (12.0%)	2 (0.8%)
Working near to or at your physical limits	2 (0.8%)	19 (7.6%)	218 (87.2%)	11 (4.4%)
Lifting/moving heavy materials or equipment	0 (0.0%)	17 (6.8%)	102 (40.8%)	131 (52.4%)
Continuing to work when injured	0 (0.0%)	2 (0.8%)	30 (12.0%)	218 (84.2%)
Work schedule, e.g., overtime, irregular shifts	10 (4.0%)	72 (28.8%)	167 (66.8%)	1 (0.4%)

Pearson's Product Moment Correlation Coefficient analysis showed that there was a significant relationship between prevalence of WMSDs and the age of the respondents ($r = 0.42$, $p = 0.001$*)

and the years on the job by the respondents (*r = 0.17, p = 0.01**), respectively. There was no significant relationship between prevalence of WMSDs and hours spent standing by the respondents (*r = -0.23, p = 0.66*).

Discussion

This study was designed to evaluate the prevalence of WMSDs among highway sanitary workers of LAWMA, Lagos State, Nigeria. A total of 250 copies of the questionnaire were distributed and all the copies were returned, giving a response rate of 100%. The 12-months and point prevalence of WMSDs among the highway workers of LAWMA was observed to be 24.8% and 17.2%, respectively. Three-fifths of the respondents who had WMSDs reported gradual onset of the disorders. All but one respondent reported that the discomforts they experienced were due to the professional tasks. A third of the respondents who had WMSDs had onset at the age range of 51 years and above. Lower back pain was the most common area of discomfort followed by the knee and then the hip. Almost half of the respondents with WMSDs practiced self-medication. About 81% of them reported that WMSDs affected their job performance.

A 100% response rate indicates interest and willingness of the respondents to participate in this study. Friedrich, Cermak, and Heiller (2000) also had a high response rate of 97.6% in a similar study on the prevalence of WMSDs among sewage and sanitary workers in India. Abou-ElWafa, et al., (2012) reported a response rate of 75% among Municipal Solid Waste collectors in Egypt.

The 12-month and point prevalence of WMSDs among highway sanitary workers of LAWMA (24.8% and 17.2%, respectively) imply that there is a low prevalence of WMSDs among them. This may be explained by the higher percentage of younger LAWMA workers aged 20-49 years (88%) compared to older workers aged 50 years and older (12%). As such, these younger highway sanitary workers of LAWMA may also have spent fewer years on the job compared to their older

counterparts. This suggestion is based on the fact that there was a significant relationship between the prevalence of WMSDs and ages and years on the job. Furthermore, a greater percentage of LAWMA workers reported the onset of WMSDs at age 51 and older. Friedrich, Cermak, and Heiller (2000) reported that the 12-month prevalence rates of neck, upper back and lower back pain were 52.4%, 54.8% and 72.8%, respectively, among sewage and sanitary workers in India. Waste collecting has been reported as a physically demanding job, which is associated with a high prevalence rate of MSDs (Poulsen, et al., 1995; De Looze, et al., 1995; Frings-Dresen, et al., 1995; Kuijer, et al., 2000; Schibye, et al., 2001; Abou-ElWafa, et al., 2012). Abou-ElWafa, et al., (2012) observed that the percentage of musculoskeletal complaints of Municipal Solid Waste collectors in Egypt during a 12-month period was as high as 60.8%.

The observation in this study that the most common area of discomfort was the lower back followed by the knee, hip and ankle/foot may be due to long hours of standing and bending at the waist during the course of duty. Postures adopted by these highway sanitary workers for greater than one hour while on the job predispose the vertebrae in the lower back and the weight-bearing joints of the lower limbs to strain, with resultant wear and tear. That the lower back was the most common area of discomfort supports the findings of previous studies (Friedrich, Cermak, and Heiller 2000; Krause, Scherzer and Rugulies, 2005; Wood and Buckle, 2006). Friedrich, Cermak, and Heiller (2000) stated that work disability during the preceding 12 months to their study due to lower back pain was significantly positively associated with age, disability, weekly duration of stooping and lifting. Krause, Scherzer and Rugulies (2005) reported that the 1-month prevalence of severe bodily pain among hotel room cleaners was 47% in general, 43% for neck, 59% for upper back, and 63% for lower back.

The finding in this study that 59.7% of the highway sanitary workers who had WMSDs had a gradual onset and 40.3% had a sudden onset is in agreement with the report by Felson (2000) that stated that WMSDs can be sudden or gradual varieties of diseases that cause pain or discomfort in the bones, joints, muscles, or surrounding structures, and they can be acute or chronic, local or diffuse. Podniece (2008) reported that most MSDs were cumulative disorders resulting from exposures to high or low intensity load over a long period of time.

The four major job risk factors associated with WMSDs in the highway sanitary workers (continuing to work when injured, working in the same position for long periods, carrying, lifting or moving heavy materials or equipment, and performing the same task over and over) identified in this study is in agreement with previous studies (da Costa and Vieira, 2010; Abou-ElWafa, et al., 2012). For instance, Abou-ElWafa et al. (2012) reported that workplace activities such as heavy lifting, manual handling, prolonged sitting and standing, bending and repetitive tasks are known risk factors for MSDs (Keyserling, 2000; Schibye, et al., 2001; Hoozmans, et al., 2004; Ijzelenberg, Molenaar and Burdorf, 2004).

The observation that there was a significant relationship between the age and prevalence of WMSDs among the highway sanitary workers, especially among the older ones, implies that the older the workers are, the higher the risk of having WMSDs. Friedrich, Cermak, and Heiller (2000) also reported that the prevalence of spinal troubles increased with age in sewage and sanitary workers India. Guo (2002) reported that the prevalence of MSDs increases as people enter their working years and, by the age of 35, most people have had their first episode of back pain.

It was also observed that there was a significant relationship between the number of years on the job and the prevalence of WMSDs among the participants. This means that the longer the years spent on the job, the higher the prevalence of WMSDs. Rajnarayan (2008) reported that one of the

risk factors associated with the occurrence of WMSDs among sanitary workers in India was the length of practice in their profession. Abou-ElWafa, et al., (2012) observed that one of the independent risk factors for musculoskeletal symptoms among Municipal Solid Waste Collectors was the longer duration of employment.

Conclusion

There was a low prevalence of WMSDs among highway sanitary workers of LAWMA, which may be due to the higher percentage of younger workers compared to the older ones. The most commonly affected body part was the lower back. Increasing age and years on the job by the workers are significant factors that can contribute to development of WMSDs among highway sanitary workers.

RELEVANCE OF THE STUDY

Based on the findings of this study, it is hereby advocated that:

- Highway sanitary workers of LAWMA should be enlightened on a regular basis through seminars and workshops by physiotherapists on the dangers of WMSDs and their risks factors in order to prevent them.
- Highway sanitary workers should be taught correct lifting techniques, good working postures and should avoid working in the same positions for long periods as well as repetitive tasks.
- The management LAWMA should provide highway sanitary workers with improved ergonomically designed tools and equipment.
- Highway sanitary workers should seek early medical help when symptoms are observed.

Limitation of the study

The Yoruba language-translated Nordic questionnaire that the researchers administered to the unlearned (illiterate) respondents was not validated before the study. It is being validated now.

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Conflict of interest: None

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