Original Article

Prevalence of Work-Related Musculoskeletal Disorders among Dental Workers in Enugu Metropolis, Nigeria

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ABSTRACT

Background: Work-related musculoskeletal disorders (WRMSD) are the main occupational health hazard among several clinicians, but its prevalence among dental workers in Nigeria has not been well-studied. **Objective**: This study evaluated the pattern and prevalence of WRMSDs among dental workers in the Enugu metropolis, Nigeria. **Materials and Methods**: Six hospitals with dental clinics participated in this cross-sectional survey in the Enugu metropolis. One-hundred and fifty (150) standardized musculoskeletal symptom (Nordic) questionnaires were adopted and distributed, of which 141 were returned. The questionnaire elicited data on demographic characteristics and carrier profiles, ergonomics, and the body parts involved in the occupational activities. **Results**: The results indicated that 83% of the respondents sustained musculoskeletal injury more than once. Bending (66%) and performing repetitive tasks (58.2%) were the most performed risk activities. The lower back (66%) was the most affected body part, followed by the upper back (58.9%), neck (51%), shoulder (47.5%), and hip (46.1%). The most common preventive measures taken by individuals were resting (57%) and avoiding lifting (53.2%). **Conclusion**: There is a high prevalence of WRMSD among dental workers, with potential to having negative effect on their work habits, and reduced productivity.

Keywords: *Dental workers, Enugu Nigeria, prevalence, work-related musculoskeletal disorders*

Introduction

Musculoskeletal disorders affect nerves, tendons, muscles, and supporting structures such as intervertebral disks, with symptoms ranging from mild periodic discomfort to severe chronic and severe pain.[1] It majorly affects the neck, shoulder, back, wrist, and hand with common signs such as decreased range of motion, deformity decreased grip strength, and loss of muscle function. Symptoms include pain, numbness tingling, cramping with burning sensation, and stiffness[2]

The term work-related musculoskeletal disorders (WRMSDs) used in this study relates to signs and symptoms arising due to a series of micro-traumas to bones, joints, ligaments, muscle tendons, blood vessels, and nerves, which accumulate and are intensified by work.[3] Many occupations place high physical and mental demands on employees, putting them at risk of developing a WRMSD. Workers' habits must be continually reassessed to ensure proper posture, body mechanics, equipment use, stretching techniques, frequent breaks, and overall healthy lifestyles.[4] A multicenter epidemiologic study has shown that over 65% of dental healthcare workers suffer from

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musculoskeletal disorders during their working careers, causing pain and discomfort, forcing them to take time off from the surgery, and in some cases leading to retirement.[2] The work by Leggat *et al.*[5] also highlighted that WRMSD among dental health workers might considerably contribute to sick leaves, reduced productivity, and the future possibility of early retirement. Similarly, the work by Hayes *et al.*[6] on the prevalence of WRMSD among dental healthcare workers showed that WRMSD had contributed as high as 64 to 93% of pain in clinicians.

According to Yasobant and Rajkumar,[7] the causes of WRMSD are multifactorial, including workplace conditions and exposures and organizational, psychosocial, and socio-cultural variables among others. Daily exposure to physical risk factors and insufficient rest or recovery time are among the principal organizational factors that can cause musculoskeletal disorders.[8] The intrinsic and extrinsic (physical) factors which include the work procedures, equipment, and environment lead to biomechanical stress on the muscle, tendons, spinal disks, and nerves.[9,10] Force, repetition, awkward or long-term static postures, vibration, and work in low temperatures are also considered principal physical work-related risk factors for musculoskeletal disorders.[11,12]

Thus, adequate knowledge, skills, and information on working methods and techniques, as well as on working movements, postures, and loads are necessary to help reduce the risk of musculoskeletal disorders.[13] It has been suggested that injuries caused by WRMSD or similar cumulative trauma disorders can be reduced or prevented by applying ergonomics in dental equipment and instrument design.[14] Occupation ergonomics attempts to improve the fit between the workforce and the work environment through the optimized design of jobs and work systems. Ergonomics programs most often focus on physical job features, such as tool or workstation dimensions, heavy lifting, awkward postures, and repetitive tasks.[2]

However, much of the focus regarding WRMSD has not been thoroughly addressed among dental workers in Nigeria. Dental workers may be subjected to tasks due to the nature of their profession, which can be very physically challenging and labor-intensive, involving direct contact with patients. They include performing manual work, continuous bending, or transferring dependent patients, with few breaks to relieve the continuous load of static muscle contractions.[15,16] Previous studies have shown that dental workers are commonly involved in repetitive work using the same muscles and tendons for a considerable part of their working duration, which may be responsible for fatigue and injuries.[16,17] They also engage in awkward postures, with the hands above shoulder height or with the wrist noticeably bent, in which the joints are more susceptible to injuries and muscles have less capacity for exerting force.[18] There is scarce evidence on WRMSD prevalence and pattern of presentation among dental workers in Nigeria. An assessment of the WRMSD among dental workers and the underlying factors associated with it is required to elucidate the nature of this important issue and guide in drawing ergonomic programs targeted at improving their working practices. Thus, the present study evaluated the pattern and prevalence of WRMSDs among dental workers in the Enugu metropolis.

Materials and methods

Design

This cross-sectional descriptive survey was carried out to investigate the prevalence of work-related musculoskeletal disorders among dental workers in the Enugu metropolis, which was randomly selected from six hospitals with dental clinics: the University of Nigeria Teaching Hospital, Ituku-Ozalla Enugu, Federal School of Dental Technology, and Therapy Enugu, the State Dental clinic; and three private dental clinics within Enugu metropolis.

Ethical considerations

The ethical approval for this study was obtained from the University of Nigeria Teaching Hospital Research Ethics Committee (NHREC/05/01/2008B-FWA00002458-1RB00002323). All participants gave their informed written consent, and the study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Sample size calculation

The sample size was determined using the formula for cross-sectional studies at 95% confidence interval and 5% error margin. A sample size of 141 was calculated to be adequate for the study.

Participants

This study utilized a convenience sampling technique to recruit participants from the selected hospitals in Enugu metropolitans. This study involved 141 dental workers between the age ranges of 21 and 70 years who are operating within the Enugu Metropolis, registered with the selected hospitals, who are willing and available to participate in the study. Those who had a history of surgery to their lower back, ankle, and foot or any deformity of the spine, knee, foot ankle joints, and who had cognitive impairment affecting their ability

to understand the context of the questionnaire were excluded from this study.

Procedure

Participants were contacted in-person within the dental unit of the selected hospitals. The purpose, procedures, and relevance of the study were explained to the participants, based on which their written informed consent was requested and obtained.

The biodata of the participants (age, marital status, rank or occupation, and religion and tribe), job history and method of work, physical load, and musculoskeletal complaints were identified and defined by the presence or observation of pain in each specific body region using the standard and prophylactic method adopted concerning the musculoskeletal complaint.

Questionnaire

A standardized musculoskeletal symptom (Nordic) questionnaire was adopted and distributed to collect data for this study. The questionnaire comprised two sections: demographic characteristics and career profiles, ergonomics, and the body parts involved in the occupational activities. The section elicited information on the general characteristics of the dental workers, while the second section comprised four-part Nordic questionnaires which consisted of 20 items (WRMSDs based). Each eliciting information on job history and method of work, physical load, and musculoskeletal complaints was identified and defined by the presence or observation of pain in each specific body region using the standard and prophylactic method adopted concerning the musculoskeletal complaint. Also, their individual knowledge of musculoskeletal symptoms and their prevalence were evaluated.

Statistical analyses

Before data collection, PASS and NCSS computer software version 2000 determined the sample size power (n = 200). Further, D-Augustino normality test was conducted to confirm normal population sampling. The descriptive statistical analysis of frequency and percentages was used to analyze the data. All analyses were carried out with the SPSS computer statistical software version 20.

Results

Table 1 shows that most of the respondents were male (57.4%), within the age range of 21–30 years (36.2%) with a mean age of 37 years, most of them were married (64.5%), and the majority (91.5%) were Christians. The table also demonstrates that most of the respondents (85%) were Igbos and the proportion of the respondents who had worked for 5 years (38.3%) was more than those who had worked 4 (19.1%), 3 (14.2%), 1 (14.2%), and 2 (11.3%) years, in that order.

Table 1: General characteristics of participants

Variables		Frequency	Percentage
Sex	Male	81	57.4
	Female	59	41.8
Marital status	Single	40	28.4
	Married	91	64.5
Religion	Islamic	03	2.1
	Christianity	129	91.5
Tribe	Igbo	21	85
	Hausa	1	0.7
	Yoruba	6	4.3
Years of experience	1	20	14.2
	2	16	11.3
	3	23	16.3
	4	27	19.1
	>5	54	38.3

Table 2: The pattern and prevalence of WRMSDs among dental workers in Enugu metropolis

Variables		Frequency	Percentage
Have sustained WRMSD		136	96.4
Have not sustained WRMSD		5	3.6
Have sustained WRMSD at	Neck	72	51.1
	Shoulder	67	47.5
	Hip	65	46.1
	Upper back	83	58.9
	Elbow	35	24.8
	Knee	42	29.8
	Wrist/ hand	34	24.1
		32	22.7

Key: WRMSD, work-related musculoskeletal disease

Table 2 shows that most respondents (96.4%) have sustained WRMSD, while five (3.6%) have not. The most affected part of the body includes lower back injuries (66.1%), upper back (58.9%), neck (51.1%), shoulder injuries (47.5%), and hip (46.1%), while the ankle/foot was the least (22.7%) affected.

Table 3 shows that most (58.2%) of the dental workers sustained injuries when applying modalities and performing a repetitive task. Most (66.0%) of them indicated that they were bending when the injury occurred, while 34.8% and 19.1% claimed that their injuries occurred when lifting heavy equipment/patients and when transferring patients, respectively.

As indicated in Table 4, the majority of the respondents (57.4%) used rest to treat WRMSD, followed by medical treatment (52.5%) and exercise (51.1%). In

Table 3: Distribution of WRMSD across work characteristics among dental worker

Variables	Frequency	Percentage
Applying modalities	60	42.6
Repetitive task	82	58.2
Bending	93	65.0
Transferring patient (s)	27	19.1
Lifting heavy equipment	49	34.8

Table 4: Type of treatment used by the subjects who sustained WRMSDs

Variables	Frequency	Percentage
Surgery	37	26.2
Medical	74	52
Rest	81	57.4
Exercise	72	51.1
Postural adaptation	43	30.5

Table 5: Adjustment of work tasks due to WRMSDs

Variables	Frequency	Percentage
Avoid lifting	75	53.2
Frequently change the working position	50	35.5
Change schedule	34	24.1
Decrease manual techniques	30	21.3
Encourage patients' responsibility	25	17.7
Increase use of mechanical aids	70	49.6
Increase administrative time	5	3.5
Decrease patients' care time	25	17.7
Increase use of other personnel	60	42.6
Stop working when hurt or symptoms occur	43	30.5
Take rest breaks or pause during work day	71	50.4
Use improved body mechanics	20	14.2

addition, 30.5% used postural adaptation while 26.2% used surgical treatment.

Finally, Table 5 showed that WRMSD affected the ability of the dental workers to lift objects (53.2%); in 35.5% of them, it led to the change of working positions frequently, while in 24.1%, there was a change in the work schedule. Also, 21.3% decreased the use of manual techniques, 17.7% of the dental workers encouraged patients' responsibility in carrying out treatment, and 49.6% increased their use of mechanical aids. In addition, there was a decrease in patients' care time in 17.7% of the respondents; 42.6% claim that they increased their use of other personnel; while 30.5% and 50.4% stopped working when hurt and took rest, respectively. Only 14.3% of them applied an improved body mechanics.

Discussion

This study aimed to assess the pattern and prevalence of work-related musculoskeletal disorders (WRMSDs) among dental workers in the Enugu Metropolis. The result of the study revealed that a majority of the respondents have sustained low back pain, followed by an upper back injury. This is in line with the findings of Buckle *et al.*[19] which revealed that WRMSD majorly affects the lower back, neck, shoulder, elbows, forearms, wrist, and hands. This finding also corroborates with the findings of Blyth *et al.*,[20] which showed that musculoskeletal pain is the major and most common cause of chronic pain and physical disability that affects hundreds of workers across the world. Also, Adegoke *et al.*[21] reported similar findings on the prevalence of work-related musculoskeletal pain among physiotherapists, which revealed that the majority of the physiotherapists have sustained low back pain followed by wrist pain. This high prevalence could be due to the frequent bending and poor posture associated with their work.[6,21]

The result indicated that the subjects sustained WRMSD when they were utilizing modalities, performing repetitive tasks, bending, transferring dependent patients, and lifting heavy equipment. This confirmed the findings of Adegoke *et al.*,[21] which showed that transferring dependent patients and performing repetitive tasks were the most frequent causes of WRMSD in their study among dental workers.

Rest was the most commonly used treatment modality by dental workers when they sustain WRMSD, followed by medical treatment and exercise. Other treatments include postural adaptation and surgical treatment. These findings did not agree with the findings of Adegoke *et al.*[21] which stated that only a few (4.2%) of the injured physiotherapists in their study used rest to reduce pain but mostly modified their position and work environment to reduce their symptoms. This difference in their findings could be due to the difference in the professions among the populations studied. Adegoke *et al.*[21] assessed physiotherapists, which is a reference profession on the concepts of ergonomics and best intervention for WRMSDs. This difference could indicate a path for improvement and is noteworthy in interventional programs designed to improve ergonomics practice among dental healthcare workers.

On the contrary, the sustained injury affected their work habits in different patterns as most of the dental workers altered their work habits due to WRMSD, while around two-fifths of them did not. It was also observed that the

dental workers mostly avoided lifting heavy objects as they also frequently changed their working positions and working schedules, decreased manual techniques, encouraged patients' responsibility, increased the use of mechanical aids, increased administrative aids, increased patient care time, increased use of other personnel, stopped working when hurt, took a rest break, and use improved body mechanics, all as coping strategies.

Finally, this study revealed a high prevalence of WRMSD among dental workers in the Enugu Metropolis. This is consequent to an adverse effect on their work habit and can contribute considerably to sick leaves, reduced productivity, and the future possibility of early retirement, as opined by Leggat *et al.*[5] As recommended in the work by Ambarwati *et al.*,[22] there is a high need for interventions that help reduce the risk of WRMSD among dental workers as well as other healthcare workers considering the manual and ergonomic dynamics of their work. Such intervention could include educating them on the basic principles of ergonomics and providing ergonomic chairs and proper working tools that are designed with ergonomic sense.

Study limitations: Being a cross-sectional design, its utilization of self-report for the assessment of the ergonomics practices may have a diminishing effect on the study findings. Nevertheless, this study adds valuable information to the literature on the knowledge gaps and poor ergonomics practices of dental workers in the Enugu metropolis with their resultant prevalence of high WRMSDs.

Conclusion

This study showed a high prevalence of WRMSD among dental workers in the Enugu metropolis, with a consequent negative effect on their work habits and reduced productivity, mostly due to loss in man-hours. Interventions to promote ergonomic work settings are suggested to foster a healthier working experience among dental workers. In addition, because most of the affected clinicians resorted to self-medication, there is a need to educate the working population on management and preventive measures against WRMSDs.

Declaration of Helsinki

The study was conducted following the ethical principles of the Declaration of Helsinki.

Acknowledgment

Nil.

Author contributions

CCA, FNE, and SSE conceptualized and designed the study. CCA, FNE, CFE, OKO, and CIE were involved in data collection/acquisition and statistical analysis; all authors (SSE, CCA, FNE, CFE, OKO, and CIE) were involved in the writing and revising of the manuscript for intellectual content. All authors read and approved the final manuscript and agreed to be accountable for all aspects of the work.

Data availability statement

Authors are available and ready to supply the data upon request through the corresponding author.

Ethical policy and institutional review board statement

The ethical approval for this study was obtained from the University of Nigeria Teaching Hospital Research Ethics Committee (NHREC/05/01/2008B-FWA00002458-1RB00002323).

Informed consent

A written informed consent was obtained from each participant before enrollment into the study.

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Nil.

Conflict of interests

There are no conflicts of interest.

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