

Patterns of Work-Related Musculoskeletal Disorders among Practicing Sonographers in Enugu State, Nigeria

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Abstract: The prevalence and patterns of work-related musculoskeletal disorders (WRMSD) among practising sonographers in Enugu State, Nigeria was assessed in order to establish the predisposing factors and document possible measures to mitigate them. A researcher-developed semi-structured questionnaire divided into three sections was used for data collection. The first section elicited information on some demographic variables while section two sought data on the working habits, the usual posture adopted during scanning and the scanning techniques. The third part derived data on the possible musculoskeletal disorders experienced by the sonographers, possible implicating factors and the measures undertaken to mitigate them. The prevalence of WRMSD from our study was 88.1%. Shoulder pain was the most experienced WRMSD among the Sonographers (81.43%) followed by low back pain (62.86%). Repetitive twisting of the upper limb was considered by most of the respondents as the greatest implicating factor. The higher the number of patients scanned per day by the respondents the greater the symptoms of WRMSD. Preventive measures such as good work environment, acquisition of ergonomically designed chairs and equipment, break for busy clinics, reduced workload for older sonographers and encouraging periodic aerobic exercises were suggested to mitigate early onset of WRMSD.

Key words: Work-Related Musculoskeletal Disorders • Sonographers • Prevalence • Pain

INTRODUCTION

Work-related musculoskeletal disorders (WRMSD) are injuries or disorders of the muscles, nerves, tendons, joints, cartilage and spinal discs which are associated with exposure to risk factors in the workplace such as repetitive isometric manoeuvres or awkward body positions [1]. Sonography is the application of ultrasound equipment for diagnostic purposes. Work-related musculoskeletal disorders have been extensively studied in nursing profession [2-5] where it was attributed to various physical risk factors, such as manual handling, frequent bending and twisting, forceful movements and awkward working postures. It has also been investigated among radiographers [6-8] and sonographers [9, 10] where strong association was found between physical load

factor, individual characteristics, work duration ergonomics and WRMSD. Sonographers in Nigeria practice either on full time or on part time basis in government or private centres. The improvement in resolution and diagnostic accuracy of sonography has led to its applications in specialized areas such as guided biopsies, vascular studies, elastography, contrast examination, interventional procedures and anomaly scans. These recent developments invariably led to increased scanning time and employment of additional manoeuvres during scanning. It has been reported that continuous repetition of these manoeuvres, awkward body posture, furniture that does not fit the anthropometric dimensions of the staff, lack of ergonomic training in posture, poor set up of work stations, as well as long working hours without rest often lead to injuries

to the muscles, nerves, tendons, joints, cartilage and spinal discs [9,11]. The pain associated with these disorders often led to poor attitude to work, frequent change of jobs and long patient waiting times. The aim of this study was to assess the pattern of work-related musculoskeletal disorders among practising sonographers in Enugu State and to make recommendations towards alleviation of the symptoms.

MATERIALS AND METHOD

This study adopted cross-sectional survey. All the Sonographers in Enugu State (n=42) working in Government and private hospitals and stand-alone diagnostic centres were enlisted in the study. The instrument for data collection was a researcher-developed semi-structured questionnaire divided into three sections. The first section elicited information on some demographic variables while section two sought data on the working habits (number of days in a week, average number of hours/ patients in a day, types of investigations), the usual posture adopted during scanning and the scanning techniques. The third part derived data on the possible musculoskeletal disorders experienced by the sonographers, possible implicating factors and the measures undertaken to mitigate them. The questionnaire was validated by three experts from Department of Medical Radiography and Radiological Sciences of University of Nigeria. The instrument was pilot tested among sonographers in Anambra State and its reliability computed using Cronbach alpha which gave a coefficient of 0.87. Data generated were subjected to descriptive statistics and analyzed using Chi square or Fisher's exact test and analysis of variance. Probability value ($P < 0.05$) was considered statistically significant.

RESULTS

A total of 42 questionnaires were administered and all were returned fully completed showing a return rate of 100%. Sixty nine percent of the respondents were males. Greatest percentage of the respondents (40.5%) was in the age range of 31-40 years. Fifty nine per cent of the respondents had practiced sonography for more than 10 years. Most of the respondents (88.1%) adopted sitting posture while scanning (Table 1). A total of 88.9% of the respondents had experienced one form of WRMSD. More males reported WRMSD from our study than females (Table 1). Greater proportion (40.5%) had bachelor's degree qualification. The prevalence of WRMSD from our

Table 1: Demographic characteristics of the respondents and Prevalence of WRMSD

Characteristics	Respondents (%)	Presence of WRMSD	
		YES	NO
Sex			
Males	29 (69%)	27(93%)	2(7%)
Females	13 (31%)	10(77%)	3(23%)
Total	42 (100%)	37(88.1)	5(11.9)
Age of respondents (years)			
23 - 30	4 (9.5%)	1(25%)	3(75%)
31 - 40	15 (35.7%)	3(20%)	12(80%)
41 - 50	12 (28.6%)	7(58.3)	5(41.7%)
>50	11 (26.2%)	8(72.7%)	3(27.3%)
Years of practice			
0 - 5	5 (11.9%)	0(0%)	5(100%)
6 - 10	12 (28.6%)	9(75%)	3(25%)
>10	25(59.5%)	21(84%)	4(26%)
Posture adopted during scanning			
Sitting	37 (88.1%)	33(89.2%)	4(10.8%)
Sitting and standing	5 (11.9%)	2(66.7%)	3(33.3%)
Highest Educational Qualification			
DCR	1 (2.4%)	1(100%)	0(0%)
B.Sc	17 (40.5%)	12(70.6%)	5(29.4%)
M.Sc	16 (38.1%)	5(31.3%)	11(68.7%)
Ph.D	8 (19%)	5(62.5%)	3(37.5%)

Table 2: WRMS Symptoms/disorders experienced by the sonographers

Symptoms/disorders	Respondents suffering the ailment (%)
Shoulder pain	81.3
Low back pain	62.86
Elbow pain	44.29
Neck pain	27.14
Upper back pain	20.00
Eye strain	44.29
Hand/finger pain	22.86
Wrist pain/seizure	32.86
Knee joint pain	7.14

Table 3: Possible implicating factors of WRMSD/symptoms

Nature of work done	Frequency
Repetitive twisting of the upper limb	(31) 73.8%
Work task of long duration	(25) 59.5%
Increased workload	(21) 50%
Awkward postures during scanning	(29) 69.1%
Poor workplace ergonomics	(27) 64.3%
Forceful exertions	(15) 35.7%
Scanning and writing reports at the same time	(30) 71.4%
Draping of transducer cable around the neck while scanning	(12) 28.6%

study was 88.1%. Shoulder pain was the most experienced WRMSD among the Sonographers (81.43%) followed by low back pain (62.86%), (Table 2). Repetitive twisting of the upper limb was considered by most of the respondents as the greatest implicating factor (Table 3). Figure 1 showed that the higher the number of patients scanned per day by the respondents the greater the symptoms of WRMSD.

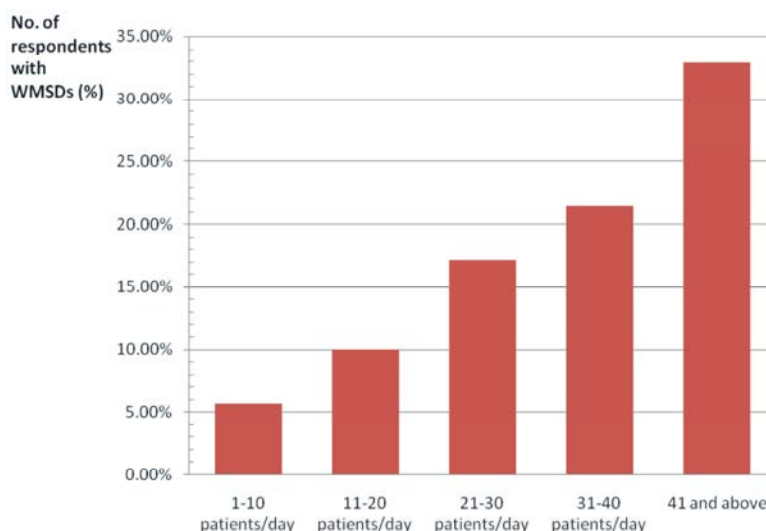


Fig. 1: Bar chart of the Sonographers' workload/day against the WRMSDs experienced

DISCUSSION

The prevalence of WRMSD among sonographers from our study was 88.1%. This is similar to the works of Pike *et al.* [12] and Evan *et al.* [13] in which they reported the incidence of WRMSD among sonographers in America to be 90% in 2008. Also Smith *et al.* [14] reported incidence of WRMSD among cardiac sonographers to be 80%. Irurhe *et al.* [15] and Magnavita *et al.* [16] found the incidence among ultrasonologists in Nigeria and Italy to be 90.9 and 80% respectively. Previous studies [9, 14, 17] had reported association of WRMSD with jobs requiring seated postures with repetitive arm or shoulder pressure and motion.

Our study showed that more sonographers that adopted sitting position (88.1%) experienced WRMSD than those that adopted sitting and standing position (11.9%). This variation may be due to the simple exercise of postural changes that allow muscles to recover from tension due to awkward positions. The transducer (probe) is applied to specific body region of the patient repeatedly over some time with different manoeuvres while seated in a position or standing. The repetitive and sometimes twisting movement impact pressure on the interphalangeal joints, meta-carpophalangeal joints, wrist, elbow, shoulder joint and the lumbar region thereby subjecting them to pressure which will result in degenerative changes.

Most of the respondents reported more shoulder pain (81.43%). This is similar to the findings of Craig [10] and Runderantz *et al.* [17]. However our finding is contrary to the findings of Irurhe *et al.* [15] and Vahdatpour *et al.* [18] in which they reported low back pain as the greatest

symptom among radiologists. The finding from our study that shoulder pain was the most reported symptom could be attributed to constant raising and lowering motions of the upper limb and repetitive twisting during various manoeuvres by the sonographers. Also for the duration of a particular scan, the arm is abducted and unsupported. Repetitive twisting of the upper limb was scored highest (73.8%) by our respondents as the greatest implicating factor of WRMSD. It could also be due to the age of our respondents who were mainly in the range of 31-40 years and very unlikely to suffer from degenerative changes in the lumbar region [2].

Our study showed that as the age of the respondents increased, the reported incidence of WRMSD increased. WRMSD increased from 20%, then to 58.3% and 72% respectively. Also as the years of practice increased, the symptoms of WRMSD increased. This finding is similar to other studies among radiologists [16, 18], X-ray Technologists [19], radiographers [7] and nurses [3, 20]. However our finding is contrary to that of Smith *et al.* [14] and Irurhe *et al.* [15] in which they found no association between age and WRMSD.

Burdorf and Sorock [2] in their study distinguished between chronic pain cases and isolated pain episodes and their relationship with age. They concluded that age was not related to isolated pain episodes. Our study however did not address this distinction. Magnavita *et al.* [16] reported that it was biologically plausible that age is an important factor in the development of back disorders.

Work-related musculoskeletal disorder was found from our study to be directly related to workload (number of cases scanned per day). This finding is similar to that

of Smith *et al.* [14] and Schoenfeld *et al.* [21]. This could be due to muscle fatigue occasioned by excessive workload with fewer hours of rest. No statistically significant association ($P > 0.05$) was found between sex, level of education and the WRMSD.

CONCLUSIONS

Work-related musculoskeletal disorder is a public health concern. Our study reported high prevalence of WRMSD among sonographers in Enugu State, Nigeria. It also showed that sonographers, who adopted sitting and standing posture, during scanning, experienced less WRMSD. This finding if adopted by sonographers may mitigate complaints of low back pain. Shoulder pains followed by low back pain were the most frequently reported WRMSD. Preventive measures such as good work environment, acquisition of ergonomically designed chairs and equipment, break for busy clinics, reduced workload for older sonographers and encouraging periodic aerobic exercises were suggested as possible measures to alleviate early onset of WRMSD.

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