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Prevalence of repetitive stress injuries among radiological technologists in the United Arab Emirates

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ABSTRACT

Introduction: Radiological technologists in diagnostic imaging are exposed to various working environments, which makes them susceptible to numerous injuries particularly repetitive stress injuries (RSIs). Adoption of improper position for a long time is an essential factor for the occurrence of RSIs. Dealing with patients and equipment handling might lead to various stress symptoms.

Purpose: The study aimed to provide current estimates of the prevalence and trends of RSIs among radiological technologists working in diagnostic radiology departments in the UAE.

Methods: Cross section study was conducted in 2017 using a structured questionnaire to assess the prevalence of RSIs. The questionnaire was derived from previous studies, and a pilot study was conducted to assess the validity and reliability. Data were collected after obtaining ethical approval grant from the institution. Data were coded and analyzed using Microsoft Excel.

Results: Eighty responses were received, and results demonstrate that back pain and neck pain are the most developed stress injuries symptoms after working in the diagnostic radiology department. Moreover, most of the radiological technologists who perform portable X-ray were reported to develop muscle spasm (26%) followed by neck pain (26%).

Conclusion: The study revealed that radiological technologists, working in the Radiology Department, are at high risk of RSIs. Lack of attention to proper body mechanics might increase the chance to develop RSIs, which may lead to decrease in productivity. Training programs, workshops, and appropriate measures are recommended to improve practice and reduce the prevalence of RSIs.

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Prevalence; repetitive stress injuries; trends; radiological technologist

Introduction

Diagnostic imaging is an essential tool to detect pathologies in routine and emergency patients. Radiological technologists perform diagnostic imaging procedures in various imaging modalities such as conventional X-ray, fluoroscopy, computed tomography (CT), magnetic resonance imaging (MRI), ultrasound, and nuclear medicine. Imaging procedures typically executed in the radiology department can be performed in other settings such as wards, operating rooms, and intensive care units [1].

Radiological technologists attend around 20–30 patients per day, and the practice of diagnostic imaging requires labor-intensive tasks to deliver quality patient care [2]. The main activities include transferring and repositioning patients who offer little to no assistance [3], and maintaining difficult position for a prolonged period of time [4] Hence, the radiological technologists are exposed to difficult working environments with various repetitive

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actions that might lead to repetitive stress injuries (RSIs) [1,3,5]. Repetitive action causes excessive stress on a part of the body resulting in inflammation, muscle strain, or tissue damage [1].

A high risk of RSIs is imposed to radiological technologists due to their occupational exposure to musculoskeletal discomfort factors [6]. RSIs occur due to repeating the same movements such as pulling, pushing, and lifting of equipment and patients [7,8]. Adoption of improper position for a long time in front of the workstation is an essential factor for the occurrence of RSIs [2,8]. Low back pain is a common complaint among radiological technologists, and symptoms of shoulder, neck, and leg pain may also occur [5].

The utilization of digital imaging facilities changed the setting of the Radiology Department in the recent years [9]. The risk of RSIs would reduce with the use of technology in digital imaging, but it was evident that repetitive stress symptoms are common among radiological technologists working in a digital department [2,8]. Besides, medical imaging students who attended clinical training in hospital setting experienced musculoskeletal complaints during their clinical practice in the Radiology Department [7].

Ergonomics and body mechanics are crucial in Radiology Departments. They play a significant role in reducing RSIs and discomfort symptoms among radiological technologists. Adjustment of ergonomics can minimize possible injuries for radiological technologists. Estimation of the prevalence of RSIs among radiological technologists can lead to recommendations and actions that improve the productivity of Radiology Department [10]. This study aimed to estimate the prevalence of RSIs among radiological technologists working in the UAE.

Methodology

Study design

This is a descriptive cross-sectional study, which estimates the prevalence of RSIs among radiological technologists in the United Arab Emirates.

Ethical approval

The study was conducted in 2017 after obtaining the ethical approval grant from the research ethics committee at the University of Sharjah (REC-17-02-20-01-S).

Sample

A convenient sample was used based on availability and willingness of the subjects to participate in the study. One hundred and twenty questionnaires were distributed among radiological technologists working in the UAE. The inclusion criteria were a full-time radiological technologist working in Radiology Departments for at least 1 year in the UAE. Radiological technologists working in clinics and small health centers, part-time professionals, and students were excluded from the study.

Instrument for data collection

Data obtained through a questionnaire derived from previous studies [3,5]. The questionnaire was in English, and the first part of the questionnaire was about the demographics data; including participant's age, work experience, and daily work duration in the department. Followed by questions about work pattern in the Radiology Department, the musculoskeletal injuries, and any other symptoms presented before or after working in the Radiology Department. The questionnaire was self-administered and completed anonymously.

Pilot study

A pilot study was carried out to determine understandability, validity, and reliability of the questionnaire. Fifteen participants were selected randomly to complete the pilot study, and the questionnaire was accompanied by a cover letter that explained the purpose of the study. Participants in the pilot study were given a chance to comment freely on the questionnaire. Based on the results and comments received from the respondents in the pilot study, minor paraphrasing and arrangement of the questions were done. Data assembled from the pilot study were not included in the primary study.

Data collection

Data were collected during from March 2017 to May 2017. Research assistants visited the Radiology Department and invited the radiological technologists to participate in the study. An introductory cover letter, which explained the purpose and expected benefits of the survey, was attached to the questionnaire. All participants completed the consent form before completing the questionnaire. Participants were assured of confidentiality and

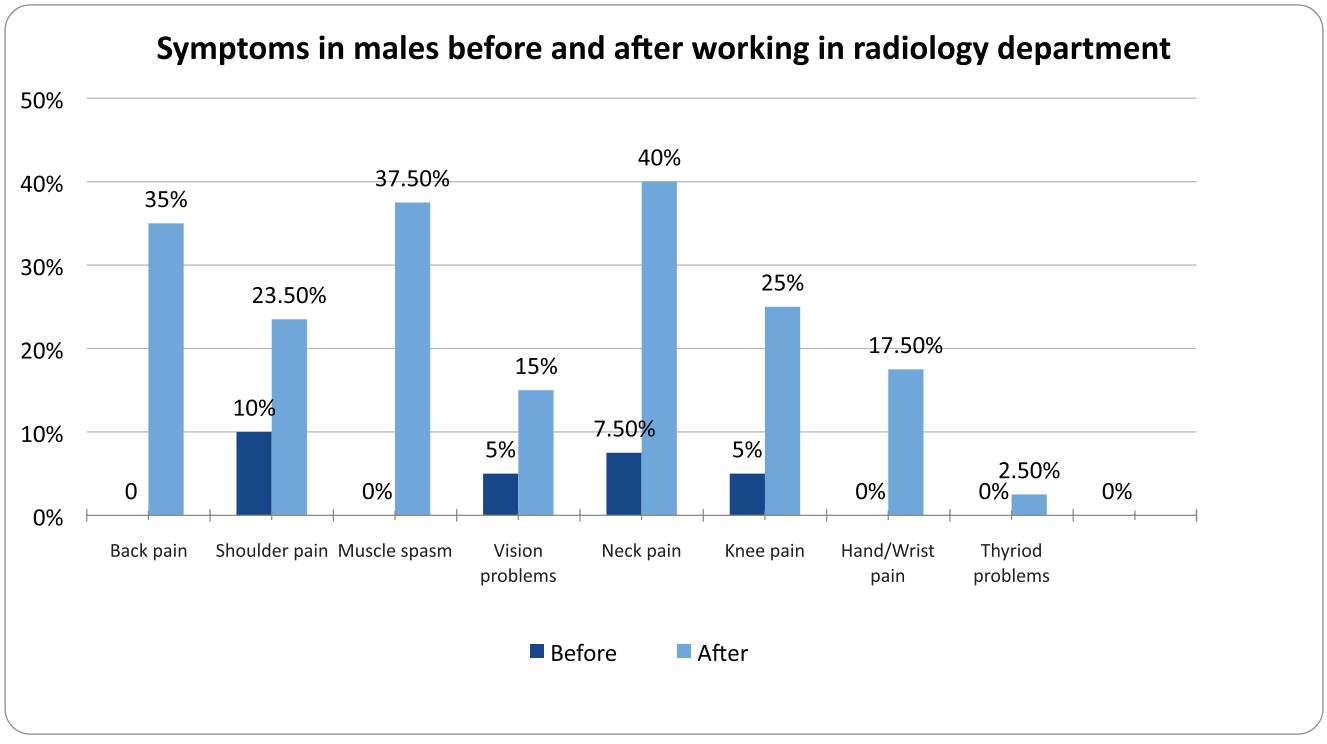


Figure 1. Symptoms in males before and after working in Radiology Department.

their right to withdraw from the study at any time without any consequences.

Data analysis

Data were coded and entered into Microsoft Office Excel 2007. All graphs and tables were created using the same software.

Results

The response rate was 67% as 80 questionnaires were received and half of the participants were females. Sixteen percent were UAE nationals, 18% were Indian, 19% were Philippines, 33% were from Arabic countries, and 10% were from other countries. Majority of respondents (40%) were between 36 and 45 years old followed by 26–35 years old (33.8%), and the minority being above 56 years old (1.2%). Participants were asked about their work experience in years and (22.5%) were between 5 and 10 years, and similarly, for 11–15 years, 21.3% had worked for 16–20 years and the rest being either 16–20 years (16.2%) or above 20 years (16.2%).

Forty-four participants (55%) reported 8 hours working day, with the remaining spending either above 8 hours (30%) or under 8 hours (15%). Although the majority (60%) reported wearing a lead apron for less than 10 minutes per day, 20 participants (25%) reported wearing the apron for more than 20 minutes per day, followed by 12 participants (15%) wearing it for 10–20 minutes per day. Most of the respondents (85%) confirmed they carry and move heavy equipment including portable machine, C-arm, cassettes and lead aprons, with a frequency between 5 and 10 times per day. Seventy-six percent reported using monitors for more than 4 hours in a day, while the remaining (16.3%, 13.8%, and 12.5%) used the monitors for 1–2 hours, less than 1 hour, and 3–4 hours, respectively.

Figure 1 shows the symptoms presented in the males only; it shows all the symptoms were present mostly after exposure to the radiology working environment. Neck pain is the most common among all male participants; 35% of males complained of neck pain after working, while 10% of men complained of having it before working, followed by 37.5% of men experiencing muscle pain after working, while two men had experienced it before working in the Radiology Department.

Figure 2 shows the symptoms present in the females, and it is observed that most of the symptoms were present after exposure to the radiology working environment with higher rates than in males. Back pain was the most common among all female participants; 62% of females complained of having back pain after working, while 10% of women complained of having it before working,

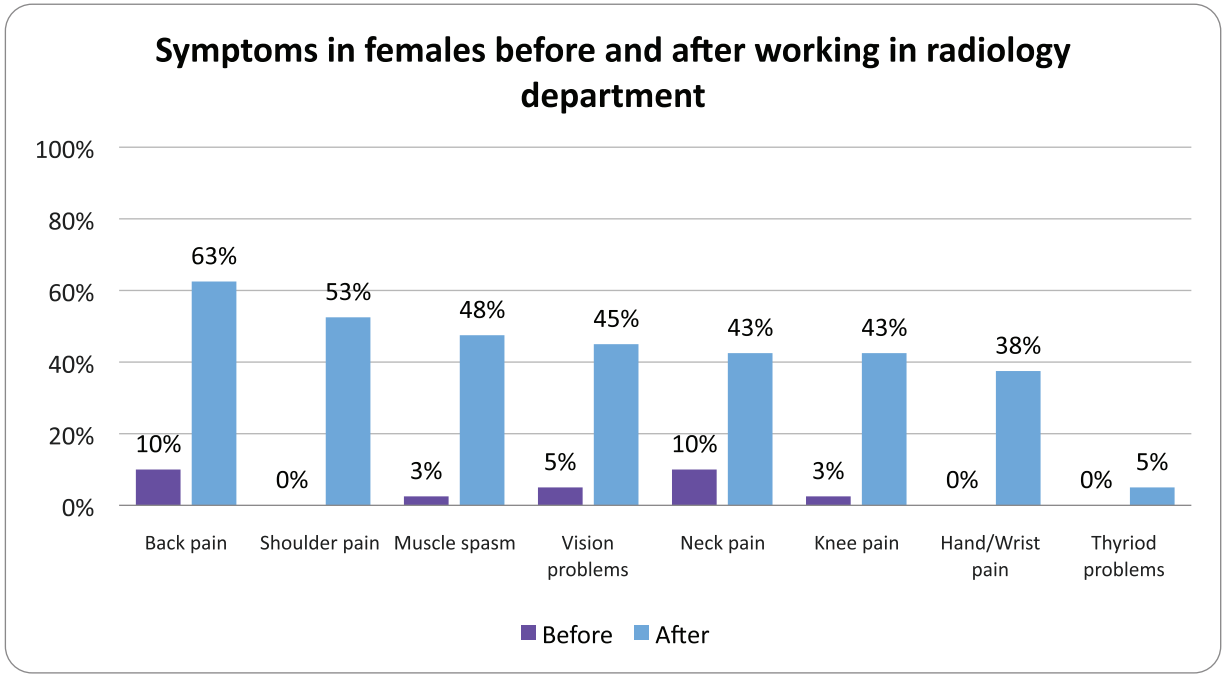


Figure 2. Symptoms in females before and after working in Radiology Department.

followed by 52.5% of women experiencing shoulder pain after working. Hand and wrist pain was present in 37.5% and 17% of males, respectively. Only two female participants were complaining of thyroid function abnormalities.

Prevalence of stress injuries is higher in female working in the Radiology Department compared to male as shown in Figures 1 and 2 but in general, 80% of participants reported repetitive stress symptoms, while the remaining 20% did not state any of the symptoms.

The relation between work pattern based on modalities per week and stress injuries for all participants was demonstrated in Table 1. It is evident that back pain and neck pain are the most developed stress symptoms after working in the Radiology Department. Moreover, most of the radiographers who perform portable X-ray were reported developing muscle spasm (26%) followed by neck pain (26%).

The result of the current study demonstrates that radiological technologists working in the UAE hospitals experienced symptoms of RSIs. Back pain was the common symptoms prevalent to radiological technologists working in general X-ray. This finding echoed with the literature as radiographers in Ghana had experienced multiple symptoms of stress injuries in their workplaces [3]. Similar results were found, as low back pain been the most commonly reported symptom, followed by the

Table 1. Work pattern and RSIs—discussion.

Modality	Total		Symptoms															
			Back pain		Hand/ Wrist pain		Neck pain		Shoulder pain		Knee pain		Muscle spasm		Vision problems		Thyroid function abnormality	
			Before (%)	After (%)	Before (%)	After (%)	Before (%)	After (%)	Before (%)	After (%)	Before (%)	After (%)	Before (%)	After (%)	Before (%)	After (%)	Before (%)	After (%)
X-ray	70	80	9	44	0	26	6	36	0	38	1	30	3	39	5	26	0	4
Fluoroscopy	45	80	3	24	0	13	3	23	0	20	0	21	1	26	1	16	0	4
MRI	30	80	3	14	0	6	3	14	0	14	1	10	1	16	4	10	0	1
CT	36	80	3	16	0	8	3	19	0	14	1	14	1	16	3	9	0	3
Mammography	20	80	1	15	0	5	3	9	0	9	1	9	1	13	3	10	0	1
Dental X-ray	29	80	1	16	0	10	0	13	0	11	0	14	3	15	0	14	0	3
Operating room	39	80	3	23	0	13	1	20	0	20	0	15	1	19	1	15	0	1
Portable X-ray	50	80	9	25	0	13	6	26	0	23	1	19	1	26	4	15	0	3
Night shift	37	80	6	16	0	11	4	18	0	19	0	14	1	21	3	11	0	3

Recommended actions to minimize the injury	Possible injury
The chair should have	Back pain
Good lumbar support	
Adjustable back and seat	
Allow foot resting on the floor through an angle between thigh and leg of 90°–105°	
Preferably with armrest and footrest	
Use the mouse with the dominant hand	Hand/Wrist pain
Achieve a suitable desk height and adjust the chair height	Shoulder pain
Eyes should point directly at the top third of the screen	Neck pain
Forearms should be approximately parallel to the floor when typing	
Elbows should be on the side	
Feet should be flat on the floor with the thighs parallel to the floor	
Wide base of support to minimize strain	Knee pain
Avoid putting a strain on muscles, and do not apply too much force to actions	Muscle spasm
Optimal distance to the monitor: 50–75 cm	Vision problems
Take small breaks to rest the eyes	
Adjust the brightness of the display to be similar to the brightness of your surrounding workstation	
Use As Low As Reasonably Achievable principle	Thyroid function abnormalities
Use inverse square law	

shoulder pain, neck pain, leg pain, and hand/wrist pain [5].

We expect to find more participants with vision problems due to exposure to scatter radiation in fluoroscopy [11]; the result reveals that 16% and 15% participants were reported vision problems in fluoroscopy and operation theatre, respectively. Conversely, vision problems stated by radiological technologists working in CT and MRI were 9% and 10%, respectively. The higher percentage (26%) of vision problems was in general X-ray, we assumed that working with monitors for prolonged durations in deemed lights may contribute to this finding [12,13]. Prevalence of stress injuries was more common in women and this might be due to the nature of women body and physiology [14].

Conclusion

In conclusion, working in the Radiology Department needs conservative measures, as it indeed contributes to stress injuries caused by repetitive movement or strains. It requires physical activities on regular basis and proper safety measures. Lack of attention to appropriate body mechanics will increase the risk to develop RSIs, which may lead to decrease in productivity and efficiency in delivering optimum patient care, along with an increase in radiological technologists' fatigue.

Recommendation

The study recommends a cohort study to evaluate the prevalence of RSIs and compare it with other health care providers. Moreover, the study recommends the below action during working in the Radiology Department to reduce the possibility of stress injuries among radiological technologists.

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