ORIGINAL ARTICLE

The Agony of It All: Musculoskeletal Discomfort in the Reading Room

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Abstract

Purpose: The purpose of this study was to determine the extent and severity of musculoskeletal discomfort in radiologists using a standardized tool, the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ). In addition, we evaluated the influence of demographic factors on the frequency of symptoms, degree of discomfort, interference of symptoms with ability to work, and overall pain.

Methods: The CMDQ was distributed via an anonymous link to all radiology trainees and faculty at our institution. The questionnaire assessed frequency and location of pain, severity of symptoms, and degree to which discomfort interfered with work. In addition, demographic data were collected.

Results: The survey was completed by 99 radiologists (39% response rate). The majority (80%) of respondents spent greater than 7 hours per workday at a diagnostic workstation. The neck (66%), lower back (61%), upper back (43%), right shoulder (36%), and right wrist (33%) were the areas where radiologists most frequently reported ache, pain, or discomfort at least once per week. More than 7 hours per day at a computer workstation was significantly associated with higher total pain.

Conclusions: Musculoskeletal discomfort in the week before the survey was reported by the majority of radiologists and was significantly influenced by demographic factors. Further investigation is needed to understand the causes of radiologists' discomfort at work and to evaluate interventions to ameliorate these symptoms.

Key Words: Ergonomics, musculoskeletal discomfort, occupational health, radiology

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INTRODUCTION

Prolonged sitting and repetitive tasks are associated with musculoskeletal injury, fatigue, and poor health outcomes [1,2]. In a study of office workers at a large telecommunications company, 77.5% of respondents reported neck discomfort in the previous week, and musculoskeletal symptoms were most frequently reported in the neck, shoulder, low back, and wrist [3]. Another study showed a high prevalence of discomfort in the neck, upper back, and lower back of occupational notebook personal computer users [4].

In the PACS environment, radiologists spend the majority of their time seated at a computer workstation and, therefore, are also at risk for work-related musculoskeletal injury. Previous studies have demonstrated a high incidence of work-related injuries such as back pain, carpal tunnel syndrome, eye strain, and headaches in radiologists [5,6]. A multicenter study in Great Britain reported radiology-associated occupational injury in 38% of surveyed radiologists [7]. Another study demonstrated a prevalence of repetitive strain injuries in 60.2% of surveyed breast imaging radiologists [8].

Fatigue and discomfort have also been identified as contributors to interpretation errors. Using the Swedish Occupational Fatigue Inventory to measure manifestations of physical fatigue, Krupinski et al demonstrated that radiologists are significantly fatigued after a long day of clinical reading. In addition, they showed that after an average of 8 hours in the clinic, radiologists' diagnostic accuracy decreased by over 4% [9-11].

There have been no studies of radiologists using validated tools designed to assess musculoskeletal discomfort among office workers. The purpose of this study was to determine the extent and severity of

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musculoskeletal discomfort in radiologists using a standardized tool, the Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) [12]. In addition, we evaluated the influence of demographic factors on the frequency of symptoms, degree of discomfort, and interference of symptoms with ability to work.

METHODS

This study was approved by the Institutional Review Board of the Emory University School of Medicine. An electronic survey was distributed via anonymous link to all radiology residents, fellows, and attendings (n = 252) at our institution using survey software by Qualtrics (www.qualtrics.com/survey-software/). The survey contained an electronic version of the CMDQ, a 54-item questionnaire about the prevalence of musculoskeletal symptoms in 18 regions of the body during the previous week. This standardized and validated survey tool assessed the frequency of ache, pain, or discomfort in specific areas of the body using a 5-point scale (never, 1-2 times last week, 3-4 times last week, once every day, and several times every day). These scores were weighted according to the survey scoring guidelines with weights of 0, 1.5, 3.5, 5, and 10, respectively, to determine an overall frequency score [12]. The degree of discomfort and the degree to which discomfort interfered with work were evaluated using a 3-point scale. Responses were weighted to calculate a discomfort score (slightly = 1, moderate = 2, very = 3) and an interference score (not at all = 1, slightly = 2, substantially = 3). The frequency, discomfort, and interference scores were multiplied to obtain a weighted score for each body area, which ranged from 0 to 90.

A total pain score was calculated for each individual by summing the weighted scores for each body part. The total weighted scores were dichotomized with those above the median categorized as high pain and those below the median considered low pain. A multivariable logistic regression was then carried out using these categories as the dependent variable and age (≥40, <40), gender (male, female), years of board certification (≥10, <10 years), rank (attending, trainee), shift length (≥7 hours, <7 hours), workstation hours, and percent time standing as independent variables.

RESULTS

The survey was distributed to 252 radiologists (31% women, 69% men; 36% trainees, 64% faculty). It was completed by 99 (39% response rate); 39% of participants were women and 61% were men, and 43% were trainees and 57% were faculty physicians. χ^2 analysis demonstrated that the data were representative of the gender and rank distribution of the population under study. The average age of respondents was 36.94 (SD = 10.19, minimum = 26, maximum = 61). The majority (80%, n = 78) of participants reported spending 7 hours per day or more at a computer workstation, and more than one-half (52%, n = 51) spent 100% of their time in a seated position (Table 1).

Overall, 87% of radiologists surveyed reported ache, pain, or discomfort in at least one body area at least one to two times in the week before the survey. The areas of the body where discomfort was most frequently reported were the neck, back, and right upper extremity (Fig. 1). Respondents reported discomfort one to two times per week or more in the neck (66%), lower back (61%),

Table 1. Demographic characteristics of survey participants

Characteristic	%
Position	
Trainee (resident or fellow)	43
Faculty	57
Gender	
Male	61
Female	39
Years board certified	
<10	29
11-20	12
21-30	10
>30	5
Not yet certified	44
Hours per day at diagnostic workstation	
1-2	7
3-4	2
5-6	11
7-8	44
9-10	33
11-12	3
Time spent standing vs seated	
100% seated	52
90% seated, 10% standing	27
80% seated, 20% standing	8
70% seated, 30% standing	1
60% seated, 40% standing	1
50% seated, 50% standing	3
40% seated, 60% standing	1
30% seated, 70% standing	1
20% seated, 80% standing	1
10% seated, 90% standing	3
100% standing	1