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Prevalence of work-related musculoskeletal symptoms among grocery workers

Dan Anton [a, *], Douglas L. Weeks [b]

[a] Department of Physical Therapy, Eastern Washington University, 310 N. Riverpoint Blvd. Box T, Spokane, WA 99202-0002, USA
[b] St. Luke's Rehabilitation Institute, Spokane, WA, USA

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ABSTRACT

Work-related musculoskeletal disorders (WMSDs) affect all sectors of the working population, and grocery workers have especially high rates. Although the incidence of WMSDs among any worker population can be estimated from workers' compensation claims, musculoskeletal symptom surveys can be used as a proxy estimate of WMSDs. The purposes of this cross-sectional study were to describe the prevalence of work-related musculoskeletal symptoms in grocery store employees from many different departments, and to determine the association between exposure to physical risk factors and presence of symptoms. Study participants (N = 254) were grocery store workers from five different stores in a medium sized grocery chain. Participants completed a self-administered survey consisting of demographic information and job history; the modified Nordic Questionnaire (MNQ); and physical component (PCS) and mental component (MCS) summary measures of the SF-36v2®. Rodgers Muscle Fatigue Analysis (Rodgers) was used to assess exposure to physical risk factors in the most difficult tasks in certain store departments. Prevalence of musculoskeletal symptoms was estimated for each body region and for various subgroups, and multivariable logistic regression analysis was used to identify independent predictors of presence of musculoskeletal symptoms. Approximately 78% of grocery store workers reported work-related musculoskeletal symptoms in at least one body region, with most workers complaining of low back and feet symptoms. The high prevalence of foot symptoms has not been previously reported for this population. Approximately 11% of employees missed work because of symptoms and 25% sought medical care for symptoms. There were no differences among Rodgers rating groups for proportions reporting symptoms. SF-36v2® scores were inconsequential predictors for musculoskeletal symptoms. Gender and age were both significant predictors of symptoms, and age predicted healthcare utilization. These findings are relevant to the grocery industry in order to target WMSD preventive interventions to specific body regions for high-risk activities within a grocery store position.

1. Introduction

Work-related musculoskeletal disorders (WMSDs) are potentially disabling conditions affecting workers. Of all workers' compensation claims, WMSDs account for the highest percentage of costs and permanent disability among workers (Bureau of Labor Statistics, 2014; National Research Council – Institute of Medicine, 2001).

While WMSDs affect all sectors of the working population, grocery workers have especially high MSD rates. Throughout the US, WMSDs are so prevalent among grocery workers that reducing the incidence and severity is Strategic Goal #1 of the Wholesale and Retail Sector National Occupational Research Agenda (NORA) NORA Wholesale (NIOSH, 2009). In Washington State during the period 1997–2005, grocery stores had a rate of musculoskeletal injury 1.8 times greater than the state average and 5th in compensable upper extremity WMSDs (using the prevention index) of all industries (Silverstein and Adams, 2007). Grocery work ranked in the top 25 occupations for injuries including neck, rotator cuff syndrome, wrist tendonitis, carpal tunnel syndrome, and back disorders including sciatica. These findings led the Washington State Safety & Health Assessment & Research for Prevention (SHARP) program to

* Corresponding author.
E-mail address: dan.anton@ewu.edu (D. Anton).

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conclude that grocery work was one of the "top 12 industries in need of focused research and prevention efforts."

The majority of studies conducted on grocery workers have focused on repetitive hand motions by cashiers and layout of the checkout station (Carrasco et al., 1995; Forcier et al., 2008; Rodacki et al., 2006; Spielholz et al., 2008; Violante et al., 2005). However, all grocery workers perform manual material handling and are exposed to physical risk factors associated with WMSDs. Examples include heavy lifting of garbage from the produce department, forceful hand exertions in the meat and deli departments, and awkward back and shoulder postures while stocking shelves.

The incidence of WMSDs among any worker population can be estimated from workers' compensation claims. A higher incidence or prevalence among an occupational group suggests that these workers have greater exposure to physical risk factors in the workplace. However, estimates of incidence require sampling large populations of workers. In addition, the prevalence of WMSDs is frequently underestimated from workers' compensation claims (Major and Vezina, 2015; Stock et al., 2014). More commonly, occupational health researchers use musculoskeletal symptoms as a proxy estimate of WMSDs (Grzywiński et al., 2016). Although more workers complain of symptoms than have compensable musculoskeletal injuries or illnesses (Major and Vezina, 2015; Merlino et al., 2003), surveys of musculoskeletal symptoms can provide reasonable estimates of the prevalence of WMSDs in various body regions.

The purposes of this cross-sectional study were to describe the prevalence of work-related musculoskeletal symptoms in grocery store employees from many different departments, and to determine the association between exposure to physical risk factors and presence of symptoms. Work prevention and healthcare utilization due to work-related musculoskeletal symptoms were also analyzed.

2. Methods

2.1. Subjects

Eligible study participants consisted of 254 employees from five different stores in a medium sized grocery chain consisting of 11 stores. In general, the stores had a similar physical layout, with a few important differences. For example, the bakery department in one store had a narrow entryway. This required the employees to move bags of dry materials (e.g., flour) from a pallet to a smaller cart, doubling the manual material handling. Also, the meat department in two stores had an older meat grinder with the exit chute at knee level. Other than these store-specific differences, all stores had the same departments, and the work tasks within these departments were similar across stores. These stores were involved in a larger project to implement a participatory ergonomics program throughout the grocery chain. Participants were eligible for inclusion if they were currently employed as a grocery worker and 18 years or older. Participants provided written consent and the Eastern Washington University Institutional Review Board approved all study procedures. Each grocery worker was compensated $5.00 for completing the surveys.

2.2. Self-report surveys

Study participants completed a nine-page, self-administered survey consisting of three questionnaires: 1) demographic and job history, 2) work-related musculoskeletal symptoms, and 3) a functional health and well-being survey. The survey packet took participants about ten minutes to complete.

Workers were asked about demographic variables such as age, height, weight, among others. They were also asked about current grocery work such as job title, years worked with current employer, and second jobs.

Self-reported musculoskeletal symptoms were assessed with the modified Nordic Questionnaire (MNQ) (Kuorinka et al., 1987). The MNQ is well validated and frequently used for studying WMSDs (Anton et al., 2002; Bodin et al., 2012; Merlino et al., 2003; Miranda et al., 2001; Nordander et al., 2013; Parot-Schinkel et al., 2012). The MNQ consists of a diagram of the body with 9 anatomical regions highlighted, e.g., low back or shoulder. For each region, respondents indicated with a yes/no response whether they had a job-related ache, pain, discomfort, or other complaint in each region in the past 12 months. For any region for which a "yes" response was obtained, the respondent then indicated yes/no whether the complaint prevented them from doing a day's work and if they saw a physician for the problem. We used the MNQ results to determine the prevalence of work-related symptoms by body region, and if present, how often the symptoms resulted in work prevention and/or healthcare utilization.

Functional health and well-being was assessed with the SF-36v2® (Ware and Kosinski, 2001). This validated survey of physical and mental health has been used extensively in research, including studies of WMSDs (Palmer et al., 2008; Turner-Bowker et al., 2002). The SF-36v2® is extremely sensitive to changes in worker's perception of health. The physical component (PCS) and mental component (MCS) summary measures were calculated from this survey.

2.3. Ergonomic job analysis

Participants from 17 different grocery store departments identified the most difficult tasks in their part of the store that affected the back (upper or lower) and hand(s)/wrist(s). At least one task, lasting at least 10% of a shift, was analyzed from each department. These tasks were videotaped by the investigators using two video cameras with a frame rate of 30 frames per second. When possible, the cameras were placed orthogonally to record the sagittal and frontal planes. Each task was video recorded for 5–30 min, depending on the task (Anton et al., 2012).

The Rodgers Muscle Fatigue Analysis (Rodgers) was used to assess the video recordings for exposure to awkward postures, forceful exertions, and repetitive movements (Rodgers, 1992). This assessment method estimates muscular fatigue during specific work tasks under the assumption that fatigued muscle is susceptible to injury. The Rodgers is appropriate for tasks performed for an hour or more, and the result of this assessment is a "Priority for Change" rating (Low, Moderate, High, and Very High). For example, if the effort level is high enough that most workers could not accomplish the task, if the continuous effort duration is greater than 30 s, or if effort frequency is greater than 15 per minute, then a task is assigned a "Very High" priority for change.

Using the video recordings, two investigators rated the tasks independently with the Rodgers and derived a Priority for Change rating for the back and hand/wrist regions. When the assessment disagreed among raters for a particular task, the final rating was arrived at by consensus.

2.4. Data analyses

Means and standard deviations or frequencies and percentiles were calculated from the demographic, job history, MNQ, SF-36v2®, and Rodgers rating data. The median age for the sample was 34.5 years. An age-group variable was formed based on the median age which classified employees into one of two groups, <35 or ≥ 35 years of age, resulting in 127 employees in each group.