BACK PAIN AND DISABILITY REPORTING BY WORKERS IN HEAVY INDUSTRY: IMPLICATIONS FOR EPIDEMIOLOGICAL STUDIES

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The purpose of this study was to estimate the prevalence of back pain and related disability in heavy industry, and to use this information to inform future epidemiological studies of back injury in this population. A 20-30 minute interview was completed for 125 workers in heavy industry. In addition to self-reported exposure, workers answered questions from the Standardized Nordic Questionnaire: 'ever' back pain; pain in the last 6 months; back pain today; whether pain today interfered with work activities; average pain intensity; and interference with daily activities of daily living. Over 41% of workers described having 'pain today', and roughly 75% of workers reported pain in the last 6 months. Because of the high proportion of workers with back pain, it could be challenging in heavy industry to find pain-free subjects to serve as the base population for a cohort study or as controls in a case-control design.

Keywords: Back pain, Case-control studies, Cohort studies

INTRODUCTION

Back strain represents about 20% of all accepted workers' compensation claims in British Columbia (BC), 23% of lost days and 20% of claims costs (WorkSafe BC, 2006). Roughly 25% all back strain claims in BC come from the heavy industries of construction, forestry, transportation, warehousing, and wood products, which have considerable exposure to risk factors for back injury (Teschke et al., 2008). Nonetheless, accepted claims may represent only a small fraction of 'back trouble' since some claims are not accepted and some pain may not be presented for claims.

In order to design control measures to minimize back pain and limit the associated costs, the specific risk factors for back pain within these industries requires further elucidation. Back pain is generally accepted to be multi-factorial (Byrns 2002) and two epidemiological study designs might be used to examine the multiple causes, a cohort design or a case-control design. However, in industries where exposure to risk factors is high and back pain is very common, it may be difficult to identify individuals without back pain to serve as the base population without prevalent injury for cohort studies or to serve as controls for case-control studies. The purpose of this study was to estimate the prevalence of back pain and related disability in heavy industry, and to use this information to inform future epidemiological studies of back injury in this population.

METHODS

Participant recruitment

This study was conducted as part of a larger exposure assessment study; a total of 125 workers participated in the study. Rather than recruiting workers through their employers, unions, or membership in other organizations, workers were contacted directly. This worker recruitment method was novel in North American exposure studies, but has been successfully used by Swedish investigators studying magnetic field exposures (Floderus et al, 2001). Participants from one of the identified heavy industries (forestry, wood products, transportation, warehousing, and construction) were recruited in one of two ways: through a WorkSafeBC database of workers with an accepted lost-time workers' compensation claim; or from worksite information on co-workers of those with claims.

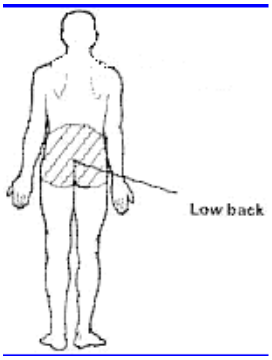
When workers with claims were contacted by researchers, 75% agreed to participate. Those who declined participation or were not currently working in heavy industry were replaced by another worker randomly selected from the WCB records until 50 such workers were recruited. Employers were then contacted for permission to visit the worksite; 75% of employers gave permission. Up to four additional co-workers were recruited from each work site; they were restricted to non-management, non-administrative workers on the same shift. Depending on the size of the company, co-workers may or may not have had a different job title or work activities than the claimant worker. When the employer was willing, the additional workers were selected from a randomized list of employees. This was complicated by a desire to measure both workers on the same shift, and typically there were few production workers on the same shift as the gateway worker who agreed to participate. In these cases, the researchers selected co-workers for task variety.

Pain Survey

A 20-30 minute interview was completed at the end of the work shift at the work site. The questionnaire was presented in paper form for the worker to refer to, and was completed

orally with the researcher recording the responses. In addition to self-reported exposure, there was a short health history section regarding low back pain and its impact on the participant's activities. Questions were taken from the Standardized Nordic Questionnaire (Kuorinka et al., 1987), referred to the low back area (figure 1), and asked about pain on the day of the interview, whether pain interfered with work activities, pain in the last 6 months (y/n), average and worst pain intensity over the last 6 months (0-10, no pain to worst pain imaginable), degree of interference with activities of daily living (ADL), social/recreational activities, and work activities (0 to 10 scale, no interference to unable to carry out activities). A full copy of the survey may be found at: http://www.cher.ubc.ca/backstudy/publications.htm.

Fig 1. 'Low back area' figure in the pain survey, as designated by the Standardized Nordic Questionnaire



Statistical analysis

Means and standard deviations were calculated for continuous variables, and frequencies of responses were calculated for categorical variables. Differences in pain reporting between industries and between recruitment method were investigated using one-way ANOVA. All statistical analyses were calculated using SPSS V 11.5 (SPSS Inc., Chicago, Illinois, USA).

RESULTS

The participants were 95% male with an average age of 42 years (table 1). Over half of participants (59.5%) were original claimant participants as opposed to co-workers recruited at the worksite.

Table 1 Participants' demographic characteristics by industry

	C	F	WP	W	T	All
Sex (% male)	100%	100%	97.2%	92.3	89.1	95.3
Recruited as a past workers' compensation claimant for a back injury	51.5%	26.3%	38.9%	53.8%	34.8%	59.5
Age in years on sampling day (sd)	43 7 (9.8)	48.5 (9.8)	38.9 (9.6)	38.8 (11.3)	43.0 (13.2)	42.2 (12)

C= construction, F = forestry, WP= wood products, W = warehousing, T = transporting

As seen in table 2, over 41% of workers described having pain on the day of the interview, with an average pain scale rating of 3.2 (SD=1.6), and 23.2% reported changes in their work activities due to pain. Roughly 75% of workers reported pain in the last 6 months; 'average' pain intensity was rated as 3.0 (1.7) and 'worst' pain intensity 6.3 (2.5). Intensity of change in

overall daily activities was 2.4 (2.3). Sub-questions indicated change in social/recreational activity averaging 2.1 (2.6), and change in work activity averaging 2.0 (2.4).

There were no differences in pain and disability reporting between industries. Surprisingly, recruitment method (compensation claimant vs co-worker) also had no relationship with pain and disability reporting.

Table 2: Participants' pain and activity reporting

	C	F	WP	W	T	All
% reporting back pain on measurement day	39.5	52.6	47.2	35.9	34.1	41.6
Mean back pain rating for measurement day + (sd)	3.6 (1.7)	3.3 (2.0)	3.2 (1.8)	3.2 (1.3)	2.9 (.79)	3.2 (1.6)
% reporting change in work activities due to back pain	22.2	30.4	33.3	17.6	10.5	23.2
% reporting back pain in the last 6 months	67.9	84.2	83.3	74.4	65.9	77.1
Mean 'worst' back pain in last 6mo+ (sd)	5.8 (2.7)	6.7 (2.7)	6.4 (2.3)	6.7 (2.1)	5.6 (2.4)	6.3 (2.5)
Mean 'typical' back pain in last 6mo+ (sd)	2.9 (2.0)	3.3 (2.0)	2.8 (1.5)	3.3 (1.3)	2.8 (1.6)	3.0 (1.7)
Mean number of disability days due to back pain (sd)	7.0 (27)	1.2 (3.8)	1.0 (2.1)	1.7 (4.5)	2.5 (7.1)	2.3 (11)
Mean change in activity due to back pain in last 6 mo (sd) *	2.0 (2.2)	2.9 (2.1)	2.3 (2.2)	2.6 (2.4)	1.9 (2.4)	2.4 (2.3)
Mean change in recreational activity due to back pain in last 6 mo (sd) *	1.8 (2.7)	2.4 (2.5)	1.7 (2.6)	2.4 (2.7)	2.0 (2.6)	2.1 (2.6)
Mean change in work activity due to back pain in last 6 mo (sd) *	1.5 (2.1)	2.3 (2.4)	1.8 (2.4)	2.3 (2.6)	1.9 (2.2)	2.0 (2.4)
Mean days per week with 30min or more exercise (sd)	3.0 (2.6)	3.5 (2.6)	2.9 (2.1)	3.3 (2.3)	3.6 (2.5)	3.3 (2.4)

C= construction, F = forestry, WP= wood products, W = warehousing, T = transporting
+ scale of 0 -10, 0 = no pain at all and 10 = worst pain imaginable
* scale of 0 -10, 0 = no change in activities and 10 = unable to perform listed activities

DISCUSSION

Pain and disability reporting in heavy industry

Over all five industries, one-third to one-half of workers reported having pain on the day of the interview. Over three-quarters of workers described having back pain in the last 6 months. Only four workers volunteered the fact that they had never had back pain. The average reported pain intensity in the last 6 months was similar to the average pain intensity of workers reporting pain today (3.0 vs 3.1, respectively), but the highest pain intensity was much higher (6.3 on an 11-point scale). The level of disability, as measured by reported interference with activities, was also high in this population. Of those workers reporting 'pain today', nearly a quarter reported changing their work activities due to pain, meaning that the

pain was intense enough to interfere with their work. The percentage of workers reporting pain was higher in the forestry and wood products industries. Although this pattern closely followed rankings in muscle activity, bending postures, and whole body vibration exposures (Teschke et al., 2008), the differences in pain between industries were not statistically significant.

There are several possible explanations for the low percentage of workers without pain in heavy industry. Lifetime prevalence of back pain in the general population is reported to be around 80%, and musculoskeletal injuries and back strains are among the most common claims in BC (WorkSafe BC, 2006). So, even with the healthy worker effect, one cannot expect finding pain-free individuals to be an easy task. Workers in heavy industry are also exposed to high levels of physical risk factors, such as manual materials handing, postural stress, and whole body vibration (Teschke et al. 2008). These factors must be anticipated and accounted for in a research study design.

Impact on epidemiological studies

The recruitment method employed in this study was in many ways a pilot to test the feasibility of accessing back injury cases through lists of workers with claims and back-injury-free individuals via their co-workers. Both groups would be required for a case-control study, a design which allows evaluation of multiple exposures in a less expensive way than a cohort study (Kraus 1997). The latter group (workers never having back pain, or not having pain for some time) would be required for a cohort study, the stronger design for causal inferences.

Although the recruitment method was successful in accessing a variety of work tasks, working conditions, job titles, and industries (Trask et al, 2006), the method was less successful in identifying pain-free individuals. This is shown by the fact that recruitment method (compensation claimant vs co-worker) had no relationship with pain and disability reporting, but also by the small number of workers reporting 'no pain'.

The best control for a case-control study or initial subject for a cohort study would be a worker who never had back pain, but only four of the 125 workers in this study described never having pain. Although fewer than half the workers reported having 'pain today', 'pain today' is a transient measure (Ong et al, 2006) and the cumulative, chronic, and recurrent nature of back pain makes 'pain today' an unsuitable outcome measure for epidemiology. Reporting no pain in the last 6 months is a far more appropriate criterion for selecting non-injured subjects for an epidemiological study, but there are few workers (<25%) who met it. Lack of pain sufficient to cause disability or interruption of activities could be used as a criterion for non-injured subjects, since few workers reported high degrees of activity disruption. Unfortunately, self-reported activity disruption seems more likely to be influenced by subjective interpretation, and certainly differences in the interpretation of the 'change in activity' question, the level of perceived interference with activities, and the modification of goals for daily activities can change the worker's reporting of this outcome. Pain is also a highly subjective measure, potentially clouded by perceived limitations, comparisons to others, and affected by perceptions of time and the context of the experience (Ong et al, 2006).

Conclusion

Depending on the definition of "no back injury", it could be challenging to find appropriate subjects for epidemiological studies of pack injury in heavy industry. Very few workers reported never having pain, so finding subjects using this as a criterion would be very difficult. Pain in the last 6 months was also very prevalent. Although many of the workers report pain,

the negative impact on their activities or 'disability' intensity was relatively low (2.0-2.4 on an 11-point scale for various daily activities). If interruption of activity is considered important to the definition, it may be easier to find uninjured subjects, but differences in interpretation of 'change in activity' could result in misclassification.

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