



Estimation of the relative risks of musculoskeletal injuries in the Andalusian manufacturing sector



J.A. Carrillo-Castrillo^{a,*}, J. Guadix^a, J.C. Rubio-Romero^b, L. Onieva^a

^a Universidad de Sevilla, Seville, Spain

^b Universidad de Málaga, Malaga, Spain

ARTICLE INFO

Article history:

Received 28 August 2014

Received in revised form

13 August 2015

Accepted 2 September 2015

Available online 19 September 2015

Keywords:

Musculoskeletal disorders

Occupational ergonomics

Risk factors

Injury rates

ABSTRACT

Background: Higher injury rates of workers with specific characteristics can show areas of interest for intervention. Worker characteristics can be a risk factor because there is a differential distribution of exposure or because a particular worker characteristic affects the worker's behavior and the effects of work in the musculoskeletal system.

Objective: To estimate the relative risk for the most frequent accident mechanisms and to present the usefulness of the information from the Continuous Sample of Working Lives for a better estimation of the relative risk based on epidemiological analysis of specific types of accident controlling for possible confounders.

Materials and methods: The most frequent accident mechanisms were identified by analyzing the official accident notifications. To estimate the exposed workers, the Continuous Sample of Working Lives dataset is used. The dataset contains employment variables such as occupational levels, sector of activity, contract type and duration of employment. It also includes relevant variables related to demographics such as location, age, sex and nationality.

Results: Adjusted relative risk confirms that female workers, foreign, non-manual and older workers have lower injury rates.

Conclusions: The use of the Continuous Sample of Working Lives is useful in the analysis of the risk factors for particular types of accidents and allows a better estimation of the relative risks of accident.

© 2015 Elsevier B.V. All rights reserved.

1. Introduction

1.1. Epidemiological aspects of injury research

Epidemiology as a research tool in the causation of workplace injury focuses on the workers' characteristics and their exposure to risks (Haddon, 1968). For a long time, estimation of the relative risk of accident has been an objective in industrial safety (Khanzode et al., 2012), mainly because a higher injury rates of workers with specific characteristics indicate the main areas of intervention (Bonauto et al., 2006) and specific categories of workers need to be considered in public policies (European Agency for Safety and Health at Work, 2009). Although worker characteristics can only partly explain the accident causation (Punnet and Wegman, 2004), and most often worker characteristics are risk factors more than

causes of the events, many studies in the literature have identified the important role of worker characteristics. Worker characteristics can be a risk factor because there is a differential distribution of exposure or because a particular characteristic affects the worker's behavior and/or the effects of work on the musculoskeletal system.

One of the threats to the validity of the results is that, when analyzed at company or regional level, the relationship between worker characteristics and injury rates can be affected by confounding effects related to differential exposures to risks. To control for those confounding effects, variables related to the exposure and occupations are needed.

In the last decades, many researchers have analyzed occupational accidents in depth (Khanzode et al., 2012). In the conceptual framework of most of the published studies, there is a previous identification of the accident type based on the circumstances notified in the accident reports. From the etiological point of view, each accident type should be analyzed separately considering the scenario (Abdat et al., 2014).

* Corresponding author.

E-mail address: jcarrillo@io.us.es (J.A. Carrillo-Castrillo).

1.2. Objective of the research

The main purpose of this paper is to estimate the relative risk of the accident mechanisms occurring most frequently in the manufacturing sector of Andalusia. Manufacturing sector is defined using the second edition of the European Statistical Classification of Economical Activities (NACE hereinafter). The estimation is performed with a specific method developed for use with the Continuous Sample of Working Lives (hereafter CSWL) to estimate the relative risk of specific types of accident while controlling for possible confounders using the information available of the exposure of the worker.

To enable such adjusted relative risk estimation, we used a coherent identification of accident types based on official accident reports according to third edition of the methodology of the European Statistics on Accidents at Work (ESAW hereinafter) (Eurostat, 2002) combined with the information on workers provided by the CSWL.

1.3. The continuous sample of working lives: estimating the exposure

The Continuous Sample of Working Lives contains a simple random sampling without stratification of an average 4% of all workers affiliated to Social Security System in Spain. The database is described elsewhere (López et al., 2014) and offers information about the personal characteristics of the worker and also about his or her whole employment history. The CSWL is available from the Spanish Social Security Agency upon request.

Although other tools such as Working Conditions Surveys (Carrillo et al., 2012) can provide some insight into the role of worker characteristics in accident occurrence, the sampling error of the surveys available compared with the CSWL is much higher and the quality of data surveyed gathered from administrative databases is not self-reported. The use of the CSWL in injury rate estimation has already been explored (Carrillo-Castrillo et al., 2013). Besides, some of the variables gathered in the CSWL are not available in Working Conditions Surveys.

Injury rates are usually calculated using the number of workers as the indicator of exposure. However the real exposure is related to the time each worker spends at work because not all workers have the same number of working hours. In the CSWL the information gathered includes the number of days that each individual worker works and the number of working hours per day of their contract. This information from the CSWL enables more accurate calculation of injury rates than just the number of workers.

For these reasons, CSWL has been chosen for estimation of injury rates using as indicator the number of hours of exposure of workers.

1.4. Worker characteristics and the risk of accident

It is important to identify which categories of workers have higher relative risk of musculoskeletal injuries in order to prioritize preventive activities. To do so, the analysis of accident notifications usually lacks information about the worker population at risk sufficient to provide useful injury rates, as it has explained before. This study analyses the influence of some worker characteristics on rates of musculoskeletal injury controlling the differential exposure (Winkel and Westgaard, 1992). In manufacturing, there are a number of studies showing that each activity is related to specific musculoskeletal disorders (Trevelyan and Haslam, 2001; Lei et al., 2005; Vieira et al., 2015).

For example, significant threat of confounding factors arises when some jobs and specific tasks are more likely to be performed

by, for example, male, foreign or non-permanent workers, thus differential exposure to risk can exist. Furthermore, there are important differences depending on the worker's age, sex or nationality for the economic activity of the employer enterprise, type of employment contract (Benavides et al., 2006) and the size of the enterprise (Mendeloff et al., 2006).

According to previous studies and the available CSWL variables (Punnet and Wegman, 2004), the most important individual worker risk factors that should be taken into account are: age, sex and nationality.

Regarding worker age, the majority of studies have reported that young workers have a higher injury rate, especially young male workers (Salminen, 2004) but at the same time young workers show lower risk of musculoskeletal disorders, accidents or occupational diseases, as it is explained latter (Walters et al., 2010). This pattern has also been studied at the company level (Pollack et al., 2007). One important confounding factor is that older workers usually have less demanding tasks (Landau et al., 2008).

When analyzing worker nationality, there are also important differences in terms of job assignment and injury rates for foreign workers because they are expected to be employed in more dangerous tasks (Ahonen et al., 2007).

In relation to sex, the literature shows us that female workers show lower injury rates in general (Islam et al., 2001) but higher risk of musculoskeletal injuries (Guo et al., 2004) although this is not the same for every country, industry or occupation. Furthermore, male workers may experience higher rates of acute injuries whereas musculoskeletal injury rates are higher for female workers (Widanarko et al., 2011), and specifically for chronic musculoskeletal disorders (Smith and Mustard, 2004). Moreover, in some cases, when analyzed at the company level, female workers seem to have more musculoskeletal injuries than their male counterparts (Warner et al., 1998; Taiwo et al., 2008) except for repetitive task exposure (Coury et al., 2002). Occupational sex segregation within the enterprise organization is a plausible explanation (Leijon et al., 2005). When controlling for the job demands, in the Netherlands it was found that women and older workers encountered higher risk (de Zwart et al., 1997).

Besides workers' characteristics, other risk factors are related to the enterprises where the worker is employed. Working in small enterprises is usually considered a risk factor. Small and micro enterprises have the worst ergonomic conditions in comparison with medium-sized and big enterprises (Sørensen et al., 2007). Another important issue is the possible effect of contract type on safety because there is evidence that workers with permanent contracts have fewer accidents than those on casual or temporary contracts (Benavides et al., 2006).

Research on the personal factors in relation to musculoskeletal disorders is one of the issues included in important public strategies such as the National Occupational Research Agenda for Musculoskeletal Disorders (Marras et al., 2009). The roles of all these worker characteristics need to be studied with multivariate techniques in order to control for the confounding factors and to deal with the differences in employment status. The CSWL provides sampling of real individual workers including data on the worker variables, and also enables the use of multivariate analysis.

1.5. Musculoskeletal accidents

In Spain, musculoskeletal disorders can be reported both as accidents and as occupational diseases. If the disorder is related to movements where the injured person's physical exertion exceeded what is normal it is classified as a musculoskeletal accident whereas if the damage results from the long-term influence of working conditions it is reported as a musculoskeletal disease and

Download English Version:

<https://daneshyari.com/en/article/1095892>

Download Persian Version:

<https://daneshyari.com/article/1095892>

[Daneshyari.com](https://daneshyari.com)