Work demands and musculoskeletal disorders from the Spanish National Survey

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Introduction

In 2005, work-related musculoskeletal disorders (MSDs) accounted for 29.5% of all injuries in Europe [1]; in Spain, this figure was 32.4% [2]. The ratio of MSDs to total injuries varies across countries [1–4], in part due to differences in definition, including whether MSDs are considered to be an occupational illness or injury. Regardless of the need to harmonize definitions of injuries affecting the musculoskeletal system, it is apparent from these statistics that MSDs are a leading occupational health problem.

Since 1987, the Spanish National Institute for Safety and Hygiene at Work (INSHT) has periodically performed a national survey of work conditions. The fifth such survey (V Encuesta Nacional de Condiciones de Trabajo or VENCT) was conducted in 2003 and offers information on self-perceived work conditions and workers’ health.

The objective of this study was to use the publicly available VENCT data to examine the prevalence of work-related MSDs and their relationship with physical load at work.

Methods

The VENCT was a stratified sample of 5236 persons from the total Spanish workforce (N = 12 606 468); survey procedures have been previously described [5]. There were two separate interviewer-administered questionnaires, one for employers and one for workers; the present study used the latter, consisting of 107 items. The three main work exposure variables centred on whether work involved carrying or lifting heavy loads, use of significant force and repetitive movements was examined among those with and without MSDs.

Background

Physical demands at work remain a leading cause of work-related injuries in industrialized countries.

Aims

To use the 2003 Spanish National Survey of Work Conditions to examine prevalence of work-related musculoskeletal disorders (MSDs) and physical load at work.

Methods

Using a representative sample of 5236 persons from the Spanish workforce, the prevalence of carrying or lifting heavy loads, use of significant force and repetitive movements was examined among those with and without MSDs.

Results

Use of significant force and carrying heavy weights decreased inversely in relation to exposure time and was always higher among those with MSD symptoms or work-related injury. For repetitive movements, prevalence increased with longer duration of exposure and was also significantly higher in those with MSD symptoms, except in the shortest duration category.

Conclusions

One-third of workers used significant force during part of their shifts, while 4% were exposed for >50% of their work shift, suggesting that 500 000 workers in Spain are at high risk of musculoskeletal injury. Moreover, repetitive movements involving >50% of the work shift affected 30% of workers. To reduce the high incidence of MSDs and work-related injury in Spain, preventive interventions should be directed at these risk factors.

Key words

Musculoskeletal disorders; survey; working conditions.
in prevalence of risk factors among respondents with and without these two health outcomes were compared using chi-square statistics.

**Results**

Of 5236 respondents, 63% were male and 37% female. Average age was 39 years; 6% were between 18 and 24 years, 32% between 24 and 34 years, 34% between 35 and 44 years, 20% between 45 and 54 years and 7% older than 55 years. By economic activity sector, 18% were employed in manufacturing, 71% in services and 10% in construction.

Almost 89% of workers reported musculoskeletal symptoms that they attributed to postures or efforts at work. However, only 19% of the workers interviewed perceived musculoskeletal risk factors at work.

There were 513 work-related injuries, affecting 11% of respondents. Of these, 146 (28%) were attributed to efforts or postures at work, the second most frequently perceived cause of work-related MSDs.

Table 1 summarizes the prevalence of the work factors by duration and their distribution among those with and without self-reported musculoskeletal symptoms attributed to work. For use of significant force and carrying heavy weights, prevalence decreased in inverse relation to exposure time and was always higher among those with MSD symptoms with increasing differences as exposure time increased. For repetitive movements, prevalence increased with longer exposure duration and was also significantly higher in those with MSD symptoms, except in the shortest exposure duration category.

Table 2 summarizes the prevalence of the work factors by duration and their distribution among those who did and did not indicate that they had suffered a work-related injury affecting the musculoskeletal system in the previous 2 years after restricting the analysis to workers remaining in the same job and centre during that period. Prevalence was higher among those reporting injuries than those without, and this gap grew as exposure duration increased. For repetitive movements, prevalence was significantly higher among those with MSD injuries but only for those in the highest exposure duration category.

**Discussion**

In this large population-based survey, we found more than one-third of Spanish workers reported using significant force or manipulating heavy weights during part of their shifts; these were more prevalent in those with MSD-related symptoms or prior injury. Moreover, the proportion of workers having to use significant force for more than half of their shift was nearly 4%, meaning that almost 500,000 workers in Spain are exposed to this risk factor. There is strong evidence that low-back disorders are associated with work-related lifting and forceful movements and higher odds ratios were observed in high-exposure populations [6]. Repetition alone has a moderate association with MSDs; however, when force is present, associations are strong, with reported odds ratios ranging from 15 to 30 [7]. In our study, 11% of respondents reported both risk factors and, consequently, are at a high risk of MSD. If we generalize these figures to the Spanish workforce, around 1.5 million workers would be at high risk. There may be some error in this estimate due to sampling strategy, questionnaire wording and possible recall bias.

**Table 1. Prevalence of selected task risk factors among persons with and without MSD-related symptoms attributed to work**

<table>
<thead>
<tr>
<th>Tasks (self-reported)</th>
<th>Overall prevalence, n (%)</th>
<th>Prevalence among persons with MSDs, n (%)</th>
<th>Prevalence among persons without MSDs, n (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting or carrying of heavy weights</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;½ of the work shift</td>
<td>224 (4)</td>
<td>212 (5)</td>
<td>12 (1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>¼ to ½ of the work shift</td>
<td>405 (8)</td>
<td>357 (9)</td>
<td>48 (4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>&lt;¼ of the work shift</td>
<td>1233 (24)</td>
<td>1055 (25)</td>
<td>178 (16)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Any</td>
<td>1862 (36)</td>
<td>1625 (39)</td>
<td>237 (22)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Using significant force</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;½ of the work shift</td>
<td>189 (4)</td>
<td>183 (4)</td>
<td>6 (1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>¼ to ½ of the work shift</td>
<td>315 (6)</td>
<td>275 (7)</td>
<td>40 (4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>&lt;¼ of the work shift</td>
<td>1138 (22)</td>
<td>969 (23)</td>
<td>169 (16)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Any</td>
<td>1642 (31)</td>
<td>1426 (34)</td>
<td>216 (20)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Repetitive movements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;½ of the work shift</td>
<td>1677 (32)</td>
<td>1502 (36)</td>
<td>175 (16)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>¼ to ½ of the work shift</td>
<td>727 (14)</td>
<td>609 (15)</td>
<td>118 (11)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>&lt;¼ of the work shift</td>
<td>716 (14)</td>
<td>575 (14)</td>
<td>141 (13)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Any</td>
<td>3120 (60)</td>
<td>2686 (65)</td>
<td>434 (40)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Fifth Spanish National Survey on Working Conditions [N = 5236 (totals in each task category may not equal 5236 due to missing values)]. NS, non-significant.
In the 2005 European Survey of Working Conditions, the proportion of Spanish workers exposed to heavy manual handling for at least half of the shift was 26.6% [8]. Besides sampling differences and year of study, there are two other important differences between the two surveys. First, the European survey was conducted at home and the VENCT at work, with potentially different recall biases. Second, the question regarding heavy loads in the European survey has a different number of shift duration categories than the Spanish one, limiting comparisons.

There is ample epidemiological [6,7] and sound mechanistic and biological [9,10] support for a causal relationship between force, repetition and awkward postures and MSDs. In theory, force alone can produce musculoskeletal injury if the energy that the tissue has to bear overwhelms its resistance and elastic properties. The amount of force needed for this to occur is unknown for most healthy tissues but may be lower if the tissue was previously in use and fatigued. Under these circumstances, failures, mostly at the microscopic level, can occur at lesser loads, such as those induced through repetitive movements. Whether these MSDs represent an acute injury or are the result of cumulative trauma disease is less clear.

Working condition surveys are useful to quantify the magnitude of exposures and focus the attention of work authorities, trade unions and occupational health services on the problem. In Spain, work-related injuries are an important public health problem, with one of the highest incidences in the EU-15 [1], and MSD-related injuries constitute the largest proportion. As expected, use of force and repetition are more prevalent among workers reporting MSDs. Efforts must be targeted at identifying these situations and minimizing exposures through the use of technology and work design strategies.

### Key points

- Surveys on working conditions are a useful source of information for evaluating and planning health interventions.
- The 2003 Spanish survey shows that still too many workers are exposed to physical demands at work and musculoskeletal problems are prevalent.
- Efforts must be made by managers and occupational risk prevention departments to identify and correct this.

### Acknowledgements

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### Conflicts of interest

None declared.

### References

2. Ministerio de Trabajo e Inmigración. *Subdirección General de Estadística. Estadística de accidentes de trabajo y enfermedades*


