Prevalence of WMSD in the sewing sector of two companies of the footwear industry

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ABSTRACT: The few available studies indicate a high prevalence of WMSD in the footwear industry, particularly in the sewing sector. Since there is a lack of studies on this issue, especially in Portugal, this paper aims to investigate the prevalence of WMSD among workers of the sewing sector in two companies of the footwear industry. Observations in the workplace were carried out and, farther, a questionnaire survey was performed. The results show that wrists/hands (42%), neck (32%), lower-back (30%) and shoulders (23%) were the most affected by musculoskeletal symptoms, although neck and back have been the only to show statistically significant differences between both companies. The study has contributed to the awareness of the prevalence of WMSD in the sewing sector of the footwear industry and point out to the need of more studies focusing either on the prevalence of symptoms or on risk factors for WMSD in this sector.

1 INTRODUCTION

In recent decades, there have been profound changes in the working conditions, which are associated with the economic globalization and the technological innovation (Vera et al., 2000). These changes show visible consequences on the workers' health, as well as in their productivity (Meerdink et al., 2005). Among those consequences, Work-Related Musculoskeletal Disorders (WMSD) have become the most common form of occupational diseases worldwide, either in developed countries or in developing countries (Moody & Brooks, 2012).

According to the European Survey on New and Emerging Risks, carried out in 2009 by the European Agency for Safety and Health at Work (2009), WMSD were identified as one of the main preoccupations in what concerns Occupational Health and Safety in the European companies. Besides the associated suffering, they are responsible for high socio-economic costs, both for the government of each country and for the society in general (Brooks, 2006). In the European Union member states, the percentage of lost days at work seems to be high in several fields of the economic activity. According to Health and Safety Executive (2012), around 61% of people, whose main health problem related to work is a musculoskeletal one, were on sick leave in 2007. In the United States, the annual costs related to the compensation for WMSD were estimated at around 45 to 50 billion dollars (Denis et al., 2008). In Portugal, although the occupational disease is mentioned in the occupational diseases list and despite their notification is mandatory, the data about the prevalence of WMSD is scarce, especially in some specific economic activities, such as the footwear industry. Partly, this may be due to the difficult to establish a clear and precise diagnosis of the pathology (Cunha-Miranda et al., 2010), which very likely may lead to a underestimation of its prevalence in the working population.

Due to the scarce information about the WMSD in the footwear industry, this paper aims (1) to assess and compare the prevalence of the Musculoskeletal Symptoms (MSS) in the workers of the sewing sector of two Portuguese companies of the footwear industry, (2) to identify some work related risk factors and (3) to highlight the activity performed in both companies. In this context, the study of the MSS arises as a predictor of subsequent musculoskeletal disorders in the studied population, therefore constituting an important step towards the WMSD prevention (Smith et al., 2009).

2 MATERIALS AND METHODS

2.1 Subjects

The studied population consists of 130 sewing sector workers of the two footwear industry
companies (A and B) from Felgueiras municipality. The participants’ selection was based on the follow-
ing inclusion criterion: individuals who had been performing duties in the company for at least one year, who were in the company on the day in which the survey was carried out and who agreed to participate in it. All the identified individuals who did not fulfill the inclusion criterion, as well as those presenting MSS that were not related to the job, were excluded. The final sample consisted of 66 females (34 from company A and 32 from company B). All the participants were informed about the objectives of the study and that all the collected data and information would be treated as strictly confidential and anonymous.

2.2 Methods

The instruments used for the data collection were a guide for the ergonomic analysis of workstations, published by the Finnish Institute of Occupational Health (FIOH), translated and adapted into Portuguese by the University of Minho (Gomes da Costa, 2004) and a questionnaire to gather information on the MSS reported by the workers, which was built, partly based on three validated questionnaires: Nordic Musculoskeletal Questionnaire—translated and validated version for the Portuguese population (Mesquita et al., 2010) to evaluate health aspects; Dutch Musculoskeletal Questionnaire—extended version (Hildebrandt et al., 2001) to evaluate socio-demographic and work aspects and Copenhagen Psychosocial Questionnaire—medium-size version (Kristensen et al., 2005), to evaluate psychosocial aspects.

Work-related MSS were evaluated in terms of pain perception or discomfort of the respondents, without pain were considered if they were reported for at least a week (Sluter et al., 2001), in the following body regions: neck, thoracic region, lumbar region, hips/thighs, knees, ankles/feet, shoulders, elbows and wrists/hands. All the participants with symptoms in a particular region answered the question about the limitations in the performance of normal activities during the last 12 months due to the reported symptoms. An ordinal scale (Mesquita et al., 2010) for the classification of the pain intensity in the different body regions (scale from 0 to 10, in which 0 represents the absence of pain and 10 represents the maximum pain) was included. The participants have also answered a question about the absence from work due to the reported symptoms and when they were worsened. SPSS® v.21.0 software was used in data statistically analysis. The Chi-square test was performed to look for statistically significant differences between the two companies regarding to risk factors of the activity under study. The Relative Risk (RR) was performed whenever possible to do so for all the statistically significant relationships. A significance level of 5% was used.

2.3 Procedures

In December 2012 the activity of sewing workers was characterized through direct observation and the support of the FIOH ergonomic analysis guide.

Subsequently, in order to make sure that the questions translated from English into Portuguese were easy to understand, a pre-test of the constructed questionnaire was conducted in 10 of the study participants. Then, during January 2013 the questionnaire was applied to all the selected workers by means of a structured interview. The duration of each interview was approximately 8 minutes.

3 RESULTS AND DISCUSSION

3.1 Characterisation of the sample

An overall response rate of 52.5% (80% in company A and 38% in company B) was reached.

The fact that the population under study was exclusively composed of females was an indicator that significantly exacerbated the prevalence of the reported MSS (Aghili et al., 2012). On the contrary, Nág et al. (2010) did not find any significant differences in the prevalence of the MSS between genders.

The ages of the participants are between 22 and 55 years old in company A and 35 ± 1 years old in company B. Analysing the ages of the participants, it was observed that in both companies the average age was similar, which suggests a population of almost middle-aged individuals. It should be noted that the prevalence of MSS tends to increase in the sewing sector (Aghili et al., 2012; Wang et al., 2007).

The participants show an average body mass index (BMI) of 26.2 kg/m² (A = 25.8 kg/m²), which is similar to that obtained in previous studies. However, this difference is not statistically significant. Some authors point out that the individuals, particularly female, with anthropometric characteristics that are far from the average population, tend to have greater probability of developing WMSD (Uva et al., 2008).

In what concerns education, in both companies the workers did not study beyond the 9th grade. According to Ozturk & Esin (2011), the prevalence of MSS was significantly different for low-educated workers. Besides, no statistically significant differences were found between companies A and B for any of the studied socio-demographic characteristics.

In what concerns labour activity, two variables distinguish, in a statistically significant manner in the two companies: time in the company in years (p < 0.053) and break time in min/day (p < 0.001). The probability of workers having less than 5 years seniority in the company B (RR = 1.754; IC 95%: 1.050-2.929) is almost twice that of the workers of company A. This result suggests that company B may be more recent than company A.

On the other hand, the probability of the workers of company A taking breaks shorter than 10 min (RR = 3.839; IC 95%: 1.862-8.124) is almost four times that of the workers of company B, where a longer break can be observed (≥10 min). According to Uva et al. (2008), regular rest periods ease the work overload and allow the muscles to recover from the effort associated to an intense work pace. In this context, insufficient breaks during work in company A may have contributed to the development of the reported MSS.

3.2 Prevalence of musculoskeletal symptoms

Table 2 presents the prevalence of workers reported symptoms (76% in company A and 72% in company B). These percentages are higher than those obtained by other authors such as Nág et al. (2010), which reported a prevalence of 76% for the weavers, while an higher prevalence value (83%) was found for office workers by Parimalam et al. (2007), However, in the sewing sector, Wang et al. (2007) and Rouquefaure et al. (2004), registered relatively lower prevalences (58% and 39%, respectively).

It should be noted that the odds ratio of developing the concomitant variables (physical exercise, heavy household chores, other working and extra-working activities), which could influence

in the prevalence of the reported symptoms were taken into account. The short time spent in physical activity by workers of both companies may be one of the risk factors (Alho, 2006) that the M. Wulff (2006) considers that it is just a prevention factor and not a WMSD risk factor. Besides, the workers with MSS not related with the job were excluded from the study.

Among the workers who reported symptoms, the most affected body regions were wrists/hands (42%), neck (32%), lumbar region (30%) and shoulders (23%). In company A, the most prevalent regions are neck and the lumbar region (47%), wrists/hands (38%) and shoulders (32%). On the other hand, in company B only the wrists/hands have a high prevalence (47%). Similarly to the current study, Kalaniu et al. (2012) referred the back (30.5%), neck (27.0%) and shoulders (15.6%) as the most prevalent regions. In turn, Ozturk & Esin (2011) registered relatively higher prevalence rates, and the most affected regions were torso (62%), neck (50.5%), shoulders (50.2%) and the lumbar region (23.9%) of sewing workers. Still, some studies reported significantly lower prevalence rates. For instance, Warralinskiu et al. (2012) registered lower prevalence rates for the lumbar region (19%), wrists/hands (16.8%), elbows (15.7%), shoulders (14.1%) and neck (14.5%).

The comparison between the results of the two companies shows that the prevalence of the MSS is higher for the upper limbs, and for company A in most of the regions of the body except for the wrists/hands, hips/thighs and ankles/feet, in which the prevalence was higher for company B. Nonetheless, statistical differences between the two companies were found only for neck (p = 0.006) and the lumbar region (p = 0.002). Thus, the mean number of days with neck pain was significantly lower in company B, while the mean number of days with wrist/hands pain was significantly higher in company A. The difference in the mean number of days with neck pain is almost twice (RR = 1.905; IC 95%: 1.239-2.929) that of the workers of company B. Similar conclusion was made in what concerns the risk factors of neck pain in the lumbar region (RR = 2.044; IC 95%: 1.341-3.117).

Taking into account the results of the current study, the high prevalence of MSS in some of the regions of the body may be explained by the way the workers of the two companies do their jobs. Direct observation of the work performance showed that workers spend their entire day in a sitting position, and adopt extreme positions of the back, neck and shoulders for long periods of time, because the work is monotonous and requires a lot of concentration. These situations are supported by several studies as responsible for the high prevalence of MSS in those regions (Zhang et al., 2011). Moreover, workers were using, on their shoes, wheels, which might worsen their adopted posture, causing them to lean forward in a more pronounced
way, aggravating the symptoms (Todd et al., 2008). This situation is reinforced by the perception of 37% of the workers, who consider that the reported symptoms are related to the work they do for long periods of time in a sitting position. The probability of the workers attributing their perceived pain or discomfort to the long working periods in a sitting position is higher in company A (p = 0.029; RR = 1.737; IC 95%; 1.075–2.800) than in company B. On the other hand, in both companies, the symptom incidence is correlated with the fact that they work having to perform highly repetitive movements (Wang et al., 2007). This may be supported by the fact that more than half of the workers of both companies did a reported repetitive movements as the most frequent cause for their symptoms. In fact, it was observed that the work cycles are short (0.5–5 min) and that the work is performed with hands placed at a high level (above elbow height). Conversely, insufficient breaks in both companies (Wang et al., 2007) as well as the use of ergonomics scissors to cut off rows surplus may also have contributed to the high prevalence of symptoms (Ozturk & Eisin, 2011; Todd et al., 2008).

3.3 Environmental conditions of the workplace

The workplace environment condition with more complaints is the exposure to extreme temperatures (38%). A statistically significant difference between both companies (p = 0.049) was found and the probability of workers reporting the exposure to temperature extremes is higher in company B (RR = 1.640; IC 95%; 1.012–2.657) than in company A. Extreme temperatures may be related to the development of WMSD (Gold et al., 2009), however, extreme temperatures were not observed in our study.

Lighting was predominant in company A when compared to company B. This situation may explain the higher trunk flexion of company A workers to improve their vision, which can be the cause of the reported neck and lumbar regions MSS (Parra-Llompart et al., 2007).

3.4 Organizational and psychosocial conditions of the workplace

The most reported risk factors are the low recognition by managers (64%), the difficulty to express feelings and work opinions (59%) and the very fast work pace (54%), which may be found in both companies. The same situation was observed although only for the very fast work pace a statistically significant difference (p = 0.003) has been found. The chance of company B participants reporting the perception of working very fast (RR = 2.351; IC 95%; 1.245–4.440) is more than twice the registered in company A. Also Wang et al., (2010) found an association between the prevalence of MSS in neck and shoulders regions and the intensive workers in sewing workers.

The difficulty to express work opinions had also been referred as a risk factor for the development of MSS. In fact, Wang et al., (2005) observed a strong correlation between neck pain control over work and the prevalence of MSS in the neck and shoulders of the sewing workers.

In what concerns the low recognition by the managers, Van den Heuvel et al., (2005) reported a connection between the carpal tunnel syndrome and the work environment, by the supervisors, in office workers. On the other hand, Borgers et al., (2002) state that a high social support from colleagues and managers play an important role in the injury recovery.

4 CONCLUSIONS

This study demonstrated a high prevalence of MSS among the sewing sector workers, mainly in the upper part of the body: The workers from company A were the most affected by the symptoms. The pain intensity was also very high, but only 9% of the workers were absent from work due to the MSS.

More studies focusing on the specific working conditions of the workforce, the industries and the potential risk factors for the development of WMSDs are needed.

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REFERENCES

Industrial hygiene and safety of work in a manufacturing industry profiles aluminum

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ABSTRACT: Environmental conditions are essential for the effective implementation of labor activities, accordingly, assess the associated agents and scenarios likely to risks and accidents is a major factor in the current conduct of management and production processes. The study aims to determine a diagnosis of simplified environmental work conditions associated with a metal industry specializing in manufacturing aluminum profiles. Therefore, we carried out measurements of the main environmental aspects, namely: noise, temperature and lighting in two different sectors of the enterprise (administrative and anodizing), verifying the quality of the work environment and the existence of risk more evident for workers. Was applied checklist regarding security conditions in the scope of work, as well as questionnaires about the viability of personal protective equipment. Upon review, it was identified that the sector anodizing has a greater propensity to agents and risks environmental and infers greater susceptibility to accidents, unsafe and unhealthy conditions.

1 INTRODUCTION

Industrial production increasingly requires efficiency and commitment from employees, who in some cases are subjected to intense work routines and comprehensive driving technological processes involving machinery without proper training, inadequate working conditions for the activity level of working overtime too high. Through this perspective, the worker is subject to develop serious problems in the short and long term, in terms of occupational health and accidents in the work.

Work safety refers to science that operates in the prevention of work accidents related risk factors operating (SALIBA, 2010). The fundamentals of workplace safety often referred to situations where unsafe acts or not aggregated to unsafe conditions originate from accidents that can affect the condition of the labor employed on a temporary or permanent basis. The occupational hygiene aims not only to identify, assess and control risks later on labor activities, but provide alternatives to examine the scope of these risks not only from the aspect of occupational diseases, as well as through the issues inherent to the comfort and well-being in this context.

According to the Brazilian Aluminum Association (Aabal), the segment of the metallurgical industry admits relevance in economic and industrial scope, since it has high rates of growth in productivity and market expansion. However, this performance is a significant parallel to unsafe working conditions, often inhumane, subjecting workers to hazards sectoral effective. In addition, there is a lack of knowledge about the actual risks, the lack of effective training, the non-recognition of the need for proper use of Personal Protective Equipment (PPE), the lack of an infrastructure work that enables a routine work more befiting with the activities of each employee.

From the assimilation of the need for a more comprehensive assessment of this segment, this study aimed to conduct a simplified diagnosis of occupational safety and health on the working conditions of a metallurgical industry specializing in manufacturing aluminum profiles, in the city of Campina Grande—PB—Brazil. It emphasized identification of environmental agents inherent in two specific sectors of business, measurement and comparison of these parameters, the provision of checklists on assessed risks and the level of usability of PPE suitable for the job in question, as well as suggestions for combat the discontinuities with Brazilian law.

2 BIBLIOGRAPHIC REVISION

Every work activity infers environmental risks, especially those inherent in the industry. A legal instrument that allows for the promotion of workplace healthier and safer consists Program Risk and Accident Prevention, the PPRA, which is predicted by Norm No. 9 (1978). Establishes the