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Effect of an exercise program on musculoskeletal symptoms and productivity: an ongoing study in an automotive industry

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INTRODUCTION:

The ergonomic risk factors that can cause or aggravate musculoskeletal disorders include: repetitive motion, awkward posture, forceful exertions, pressure points, and static postures. There is no doubt that the new forms of work led to greater ease and comfort in the lives of workers, but the need for increase specialization of workers, improving product quality and reducing production costs, leads to the appearance of various health problems, including work related musculoskeletal disorders (WRMSDs). There are evidences that performing regular physical activity reduces the risk of chronic diseases (Bairati, Larouche, Meyer, Moore, & Fradet, 2000). The implementation of physical activity programs at worksites has been increasingly common. Some studies indicate that these programs allows the prevention/reduction of manifestation of the injury, the normalization of body functions, promote relaxation and socialization between workers, improving working conditions and preparing the participants for their daily activities. However, no evidence was found to indicate an effect of physical activity programs on productivity (Proper, Staal, Hildebrandt, van der Beek & van Mechelen, 2002).

OBJECTIVES:

The main objective of this research was to investigate the effectiveness of an Exercise Program (EP) on productivity. This paper will analyze the first six months of the EP.

MATERIALS AND METHODS:

This case study is being carried out in an automotive industry located in Portugal. In this type of industry, mainly due to the high manual materials handling and repetitive activities, workers are reporting a high number of MSDs. The implementation of the EP suitable to this type of tasks was developed according to the following steps:1) The selection of the sample came from previously conducted risk assessment trough OCRA method. Considering only the sections composed by assembly lines and taking into account the OCRA results, it was found that a specific section (composed by seven assembly lines with a total of61 workers (57femaleand4male)) had a great overload of the upper limbs and therefore with higher levels of risk;2) the Portuguese version of the Nordic questionnaire was applied to the workers of the section under study. This questionnaire was administered before the implementation of the EP to assess the perception of symptoms of MSDs;3) The development of the EP was based on some of the exercises proposed by a multidisciplinary team (doctors, physiotherapists and the OSH department of the company under study). The exercises focused in areas where injuries occur more often such lumbar, wrists / hands, arms and shoulders. The EP is being implemented since February in two shifts (morning (6a.m. to 2p.m.) and afternoon (2p.m. to 10p.m.)), with four weekly sessions, which had 7 to 10 minutes of duration. Alongside its implementation, productivity data were collected from daily production reports.

The data analysis was based on descriptive statistics.

RESULTS AND DISCUSSION:

After statistical analysis of the data collected, it was found that about 95% of workers had symptoms of discomfort / pain, the most affected areas were the neck (49.2%), the lumbarregion (54.1%), shoulders (45.9%), wrists / hands (54.1%) and ankles / feet (60.6%). On the other hand, the back area (32.8%), thighs (8.2%), the elbows (14.7%) and the knees (26.2%) were body areas which had less frequency of symptoms (see Figure 1). These results were similar to those found by Kjellberg & Wadman (2007), who found that the most frequent complaints of workers with assembly tasks focussed on the shoulders (45%), neck (43%) and lower back (37%). Fredrikson, Bildt, Hägg, & Kilbom (2001) also refer to areas most affected workers in the automotive industry, neck, shoulders, lower back and wrists / hands. Still Ghasemkhani, Aten, &Azam (2006) refer feet and the dorsal area as the most prevalent MSDs, which resulted in higher levels of absenteeism.

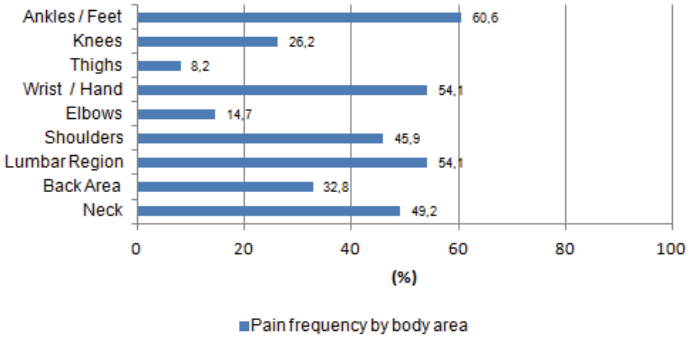
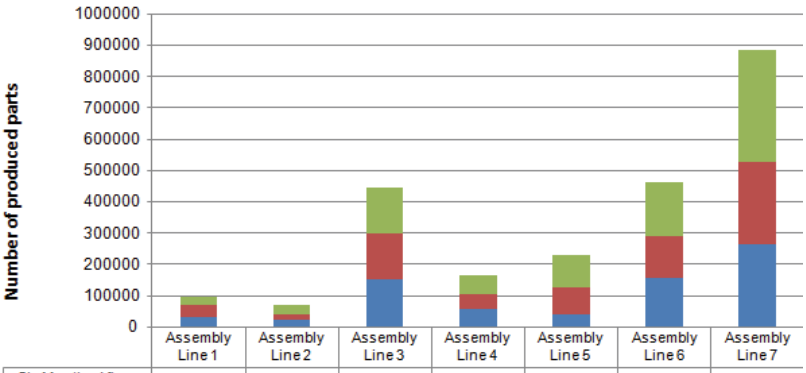


Figure 1 - Frequency of symptoms/pain by body area

An analysis of the productivity of different assembly lines of the section under study, showed no uniformity in the evolution of productivity. In some lines there was an increase in production, (i.e. increasing the number of parts produced), and in others it was found the opposite (see Figure 2).



	Assembly Line 1	Assembly Line 2	Assembly Line 3	Assembly Line 4	Assembly Line 5	Assembly Line 6	Assembly Line 7
Six Months After	24880	27540	144616	63507	103120	170947	356011
Three Months After	38460	20454	146940	46870	86378	137218	264139
Before	31139	20825	152340	56016	41620	154830	263583

Figure 2 - Productivity among the assembly lines before EP implementation, three months after EP implementation and six months after EP implementation.

No significant relation between productivity and the EP was found, at 6 months of implementation (p = 0.124). Some factors may be related to variations in the productivity namely: (1) technical problems of equipment, (2) failures in the raw material and (3) constant change in production volume.

CONCLUSION:

So far it seems that six months of EP implementation, is not enough to obtain significant results on the productivity. The program is still under implementation since this should be part of the routine of work. After full implementation it will be reassessed musculoskeletal symptoms as well as the impact on MSDs related to work. Given the trend towards increasing the framework of the MSDs, it is essential to characterize the

prevalence of pain and discomfort and different types of activity and determine the effect of intervention strategies.

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