Lumbar complaints and ergonomic evaluation in chemical industry

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1. Introduction

In 2012 Brazil was the sixth country with the highest turnover in the chemical industry. This economic branch represented 2.5% of the Brazilian economy in 2011 and employed more than 400,000 workers. However, its known that ergonomic conditions in this type of production process are related with occupational injuries and diseases (Bevilacqua, Ciarapica & Giacchetta, 2008).

According to the Brazilian Ministry of Health, there is a high prevalence of work-related musculoskeletal disorders (MSDs) in the country. The biomechanics in work process, physical inadequacies, postures, vibration exposure, cold and localized pressure are risk factors for MSDs (Maeno et al., 2006).

This study aimed to evaluate ergonomic conditions in a chemical industry in which complaints of back pain are more incidents.

2. Methods

This cross-sectional study in a factory of waterproofing, solvents and related products, and located in the city of São Paulo, Brazil. The research collected data about musculoskeletal complaints of workers described in medical reports of periodic evaluation in 2014. There are 184 workers in operational sector but 93 works in products production. The jobs with more incidences of complaints by workers about pain in the lower back were selected to be evaluated.

To evaluate the risk of low back pain, we applied the simplified evaluation checklist published by Couto (2007). From questions on job characteristics are given simple answers (yes or no), and then a sum score is set. The higher result indicates higher risk of developing low back pain interpreted as follows: 0 or 1 point – very low risk; 2 to 4 points – low risk; 5 to 6 points – moderate risk; 7 to 9 points – high risk; and 10 to 12 points – very high risk.

3. Results

The jobs with more incidences of complaints by workers about pain in the lower back were selected to be evaluated. Of the 93 workers in the manufacturing sector those jobs which had a higher incidence of back pain in the last year were: weighing operators (57.1%), the Sigma mixer operators of PVC sector (36.4%) and operators 3 in the sector of wire drawing (26.7%).

In the work of the weighing, the operator has fractionation activities (moderate risk of low back pain), lifting (high risk for low back pain) and oil replacement (low risk of low back pain).

To perform the weight lifting activity is required for the operators: to position curved trunk statically forward mainly for the handle and unloading of loads in the movement of palletizers; handling loads with hands to level close to the ground during catching or unloading of loads; lifting loads of more than once each five minutes in floor level; making efforts with hands far from the body; handling loads far from the trunk; carrying loads with the column in asymmetric position; often carrying loads up to 20 kilos; often lifting loads heavier than 10 kilos.
In the PVC sector the Sigma mixer operator job is a high risk of low back pain. To perform the activity is required: to position curved trunk statically forward in unloading loads on the pallet when the target height is low; often carrying loads next to the floor; lifting loads on the floor is often higher than once per minute; making efforts with hands far from the trunk; handling loads with the trunk in asymmetric position; carrying loads heavier than 20 kilos; often carrying loads heavier than 10 kilos; lifting loads heavier than 10 kilos frequently; carrying loads far from the trunk.

The job of operator 3 in wire drawing industry is a low risk of low back pain in the pelletizer station, very low risk in press station and low risk in extruder station.

4. Conclusion
The study found working conditions at great risk to contribute negatively on musculoskeletal health lumbar spine in weighing operators and Sigma mixer operators. There was a relationship with musculoskeletal complaints and the ergonomic evaluation of these functions. The problems in these jobs are: to carry and to lift heavy loads, unfavorable biomechanical conditions, variation in horizontal distance between worker and load, variation in height between origin and destination of loads, trunk rotation during load handling.

It is necessary to study the possibility to implement engineering solutions in order to reduce the weight handled by the operator on the jobs of weighing and Sigma mixer operator. Examples of solutions are vacuum handlers or mechanical manipulators.

References