

STUDY ON THE NEED OF HEALTH PROMOTION AND HEALTH EDUCATION PROGRAMS IN A COMMUNITY WITH OCCUPATIONAL HAZARDS – LEAD EXPOSURE

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Abstract: Health education represents a fundamental tool in the prevention of the occupational diseases. We performed a transversal study on 233 subjects, employed on a lead battery manufacturing plant (in lead battery industry). We quantified the risk factors for lead intoxication, factors that can be due to employee behaviours, production facilities, tasks and working environment. Lead-in-air concentrations has been increased but not correlated with the levels of lead in the blood of exposed workers. The average blood lead level was of 34,24 µg/dl. Fifty-six (24.04%) had a record of increased blood lead level. (blood lead level was more than 40 µg/dl). Workers had lacked knowledge about the toxicity of lead and protection against it. Inadequate personal hygiene and working habits (smoking) and poor work practices were correlated with high blood lead level. Occupational health education programs, social marketing and rigorous safety briefings are necessary for reducing blood lead level effectively.

Cuvinte cheie: expunere la plumb, plumbemie, practici de lucru, igienă personală, educație pentru sănătate

Rezumat: Educația sanitară reprezintă un instrument fundamental în prevenirea bolilor ocupaționale. Am realizat un studiu transversal pe un număr de 233 de subiecți angajați în industria acumulatorilor auto. Am cuantificat factorii de risc pentru intoxicația saturnină proprii angajaților, mijloacelor de producție, sarcinilor și mediului de muncă. Nivelul de plumb din aer a fost crescut dar nu s-a corelat cu nivelul plumbemiei. Valoarea medie a plumbemiei a fost de 34,24 µg/dl. 56 de (24.04%) dintre subiecți au avut valorile plumbemiei peste limita normală de 40 µg/dl. Respectarea normelor de igienă personală, practicile și obiceiurile individuale la locul de muncă (fumat), au fost corelate cu nivelul plumbemiei. Angajații au cunoștințe minime despre toxicitatea plumbului și modalitățile de prevenire a intoxicației saturnine. Se impun măsuri de educație pentru sănătate, marketing social și instructaje riguroase de protecția muncii pentru a reduce eficient nivelul de plumb din sânge.

INTRODUCTION

Chronic lead poisoning in the workplace remains a major health problem recognized worldwide. Health education has been suggested as an important tool in preventing occupational injuries and illnesses. The workplace is an excellent setting to implement health promotion programs for the following reasons: easy access to groups of employees, and the relative stability of the target population, availability of facilities and communication channels, the presence of health staff and those responsible for implementation and enforcement occupational health and safety on site, which facilitates follow-up.

THE AIM OF THE STUDY

The aim of this study was to develop optimal solutions which can be included in the occupational safety and health management organizational policy in order to reduce or eliminate the number of lead intoxication cases. The main objectives were: to assess and implement the corrective, preventive, and control actions for occupational lead exposure risk factors; to improve education, training and staff awareness; to advise with staff (to take counsel together) for initiatives and actions in order to increase the stream (performance) of safety and occupational health management program.

MATERIALS AND METHODS

I conducted a transversal, descriptive study which

included a number of 233 employees working in a battery manufacturing plant where the main industrial contaminant was lead. In order to identify risk factors due to the production means, tasks and working environment I carried out workplace visits, I discussed with the representatives of the Occupational Safety and Health Committee and I analyzed the medical data recorded at regular medical examinations conducted in 2009.

Characteristics of workers were examined by an interview using a structured questionnaire which included a total of 54 items which required information on behaviours, habits, attitudes at workplace, perceptions, knowledge and desire to know information about ways of lead poisoning and means of prevention.

Statistical analyses were conducted with SPSS for Windows, version 16.

The correlations between two variables were evaluated with Pearson's or Spearman correlation. Chi-square test was used to check for association between two variables.

With student's t test we compare the average blood lead level between two groups, and one-way ANOVA test was applied to check whether there were differences between several independent groups. Any p values less than 0.05 were considered statistically significant.

RESULTS

The current Occupational Safety and Health Administration Management System was implemented

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according to OHSAS 18001-2004 standard.

A percentage of 96.71% of the 233 employees surveyed were male. The seniority average was 17.24 years work, with minimum of 0.03 years and a maximum of 37.10 years. The employees worked in three shifts, the recovery time between shifts were sufficient.

The total arithmetic mean of blood lead levels was 34,24 µg/dl, with minimum value of 5,84 µg/dl and the highest one 65 µg/dl. Fifty-six workers (24.04%) had recorded blood lead levels higher than normal limit 40 µg/dl, and five subjects (2,15%) had a record of lead poisoning (blood lead level is more than 60 µg/dl.)

Lead-in-air concentrations have been increased.

Even if wearing respiratory mask it was compulsory and rewarded with a salary increase of 5%, only seventeen subjects (7.30%) recognized that they used respiratory protection all working day, while seventy-nine workers (33.91%) admitted that they never use respiratory protection.

This pattern was influenced by the fact that the mask is considered inconvenient, unnecessary or ineffective (table I)

The results of the Kruskal Wallis H test, ($H = 30.281$ and $p = 0.000$), indicated that there existed significant differences in the blood lead level, depending on the time of using the respiratory masks.

All interviewed subjects change their work clothes at the work place and store them in separate locker rooms, apart from their regular clothes. A number of 31 (13.73%) subjects declared that they never use the showers within the precincts of the factory upon ending their shifts, and a number of 25 (10.73%) subjects wash their hands rarely before having a snack of their meals. (Table II)

There existed significant differences of the average values for blood lead level depending on the habit of taking a shower when finishing the shift ($H=11,176$ and $p = 0,025$). The average of the blood lead level at the persons who declared they are used to washing their hair when taking a shower, was significantly smaller, as compared to the average of the blood lead level at the persons declaring they do not have this habit. ($t=3,23$; $p = 0,001$; IC [2,01;8,32]). The average value of the blood lead level was significantly different at the persons declaring they are used to washing their hands before taking a

snack, as compared to the persons declaring they did not have this habit ($t=2,73$; $p = 0,003$; IC [1,07;5,53]).

Smoking was forbidden at the work place, but some of the employees were caught smoking during the work visits made in the second and third shifts. A number of 125 subjects (53.65%) were smokers. The average value of the blood lead level was larger with smokers, 38,64 µg/dl as compared to the non-smokers 29,15 µg/dl. There existed a positive correlation, significantly from a statistic point of view ($p=0.00$) between the values of the blood lead level and the number of cigarettes smoked; this correlation is an average value, $\rho = 0.526$. The average value of the blood lead level at the persons declaring they were not smokers was significantly smaller from a statistic point of view, as for the persons declaring themselves smokers ($t = -6,96$; $p=0,000$; IC = [-12,1; -6,8]).

No significant statistical differences existed between the groups of subjects that were aware of the possibilities of lead intoxication and the ones not being aware of them ($p=0,42$).

No significant statistical differences existed between the average value of the blood lead levels, depending on the knowledge of the subjects concerning the effects of the lead on organism ($p=0,62$).

DISCUSSIONS

Observing the legal requirements concerning the labour safety and health, keeping the optimal working conditions and insuring an internal medical service for supervising the health condition of the workers represent only a part of the factors that insure the success of implementing the politics for continuously improving the working conditions and preventing the professional risks.

Increasing the exigency and responsibility in the control system of the work relations, improving the education, training, awareness and advising the personnel for initiatives and actions, for the purpose of increasing the occupational safety and health performances are other elements that guarantee success.

There are studies indicating that the programs of occupational education can be more efficient than the technical control in reducing the lead intoxications.

Table I. Testing with the Chi-square test (χ^2) the interdependence between the habit of wearing means of respiratory protection and the way in which the subjects have perceived the utility, efficiency or have declared themselves burdened by wearing the respiratory mask.

	How do you evaluate the efficiency of the respiratory masks?		How do you evaluate the usefulness of these respiratory masks?		To what extent does it bother you to wear a respiratory mask?	
	Value of the coefficient	P statistic significance	Value of the coefficient	P statistic significance	Value of the coefficient	P statistic significance
Result of the Chi-square test	38.62	.000	50.339	.000	15.903	.014
Result of the Fisher test	40.47	.000	54.388	.000	18.719	.004

Table II. Distribution of the investigated subjects, depending on the answers to the questions concerning the hygiene norms at the working place.

	Always	Frequently	Rarely	Never
Do you change your clothes when finishing your shift?	233 (100%)	0	0	0
Do you store your working clothes in the locker room, apart from the regular clothes, when finishing the shift?	233 (100%)	0	0	0
Do you take a shower when finishing a shift?	6 (2.58)	132 (56.65%)	63 (27.04%)	32 (13.73%)
Do you wash your hands before taking a snack or your meal?	78 (33.48)	83 (35.62)	47 (20.17)	25 (10.73)

CONCLUSIONS

The risks of professional exposure to lead were non-homogenous because of: the existence of more operations in the manufacture process; the lack of experience of the employees; the differences of susceptibility of the workers in developing diseases associated with the occupational exposure to lead; the work practices, customs, improper attitudes; lack of knowledge as concerns the risks, effects and methods of prevention for lead exposure.

Health education measures, social marketing and rigorous trainings for labour protection are necessary for promoting a sanogenic life and work style.

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