OCCUPATIONAL HEALTH RESEARCH ON THE RELATIONSHIP BETWEEN THE EXPOSURE TO INORGANIC LEAD AND CHRONIC ALCOHOL CONSUMPTION IN THE WORKERS OF A NON-FERROUS METALLURGY UNDERTAKING

CARLA IOSIP [1], D. I. BARDAC[2]

[1]PhD candidate, "Lucian Blaga" University of Sibiu, [2]"Lucian Blaga" University of Sibiu

Keywords: *negative effects, co-exposure, chronic inorganic lead, alcohol*

Abstract: *It is known that chronic alcohol consumption could be influenced by inorganic lead exposure. The present study aims at demonstrating the weight of the negative effects felt by the human body due to the co-exposure to chronic inorganic lead and alcohol. Objectives of the study: exposure assessment to lead in a research batch of an industrial community, an important casuistry for industrial chronic lead poisoning and a control group from an industrial society, without occupational exposure to lead; the assessment of the dose-response relationship regarding the exposure to lead in an industrial community; the chronic alcohol consumers in a geographic area (Baia Mare, Maramures) known for the production of alcohol consumption and chronic double-refined concentrated alcohol; the quantification of the relationship between chronic lead poisoning and alcoholism in different exposure conditions to lead and chronic alcohol consumption; the assessment effects of chronic alcohol consumption in workers exposed to inorganic lead; the assessment of the effects of alcohol consumption in the workers exposed to inorganic lead. This paper presents the correlations between the indicators of exposure and those of biological effect in the study group.*

Cuvinte cheie: *efecte negative, co-expunerea la plumb anorganic şi alcool*

Rezumat: *Se cunoaşte faptul, că un consum cronic de alcool ar potenţa efectele expunerii ocupaţionale la plumb anorganic. Studiul de faţă îşi propune să demonstreze care este ponderea efectelor negative resimţite de organismul uman datorate co-expunerii cronice la plumb anorganic şi alcool. Obiectivele studiului sunt următoarele: evaluarea expunerii la plumb la un lot de cercetat dintr-o colectivitate industrială cu cazuistică importantă pentru Saturnism cronic şi a unui lot martor dintr-o colectivitate industrială fără expunere profesională la plumb; evaluarea relaţiei doză răspuns în expunerea la plumb, într-o colectivitate industrială, la consumatorii cronici de alcool, într-o zonă geografică (Baia Mare, Maramureş) cunoscută pentru producţia de alcool etilic dublu rafinat şi pentru consumul cronic de alcool concentrat; cuantificarea relaţiei saturnism cronic – alcoolism , în condiţii de expunere diferită la plumb şi consum cronic de alcool; evaluarea efectelor consumului cronic de alcool la muncitorii expuşi la plumb anorganic; evaluarea efectelor asocierii alcoolul etilic – plumb anorganic. Articolul de faţă prezintă corelaţii existente între indicatorii de expunere şi cei de efect biologic la lotul de studiu.*

INTRODUCTION

Work methodology used in conducting this research consisted of: applying a standardized questionnaire to assess the chronic alcohol consumption, establish a separate observation sheets containing data collected through clinical examination of subjects, analysis of health status by applying the questionnaire of symptoms and syndromes and carrying out laboratory investigations (indicators of occupational exposure to inorganic lead, indicators haematological, biochemical and enzymatic of chronic alcohol consumption).

The two groups chosen were divided in terms of etiologic in two subcategories. Lot to investigate A includes samples A1 (50 subjects selected the combination of lead poisoning there - alcoholism) and A2 (50 subjects selected from the diagnosis of lead poisoning there, but not confirmed chronic alcohol consumption). Control group B includes samples B1 (50 subjects selected at which there is occupational exposure to inorganic lead but confirmed that chronic alcohol consumption) and B2 (50 subjects selected at which there is occupational exposure to inorganic lead and not confirmed chronic alcohol consumption). The two groups are similar in terms of following parameters: age, gender, professional seniority (mean age at work), exercise, activities with similar degree of participation.

They established the following correlations between indicators of exposure and the biological effect of study group A.

Percentage distribution of study subjects batch of samples A1 and A2, where the value increased or normal to blood lead level (PbS), urine lead level (PbU), delta-aminolevulinic acid in urine (DAL), hemoglobin and hematocrit, according to the department where they work subjects that there is a statistically significant correlation with the sample A1 ($p = 0.039$), where 46 of the subjects (92.0%) have high blood lead level. No statistically significant differences were found for other indicators of exposure or biological effect.

We determined that there is a link between the average values of PbS, PbU and DAL section where they work (the study subjects A). Therefore, we considered it appropriate statistical analysis of these indicators exposure and biological effect taking into account only subjects who have elevated these indicators, according to the sections where work subjects and those who have averaged over biological limits tolerable.

[1]Corresponding Auhor: Carla Iosip, 7 Gutinului street, Baia Mare, Romania, e-mail: iosip_estrada@yahoo.com, tel +40-0744505802
ACTA MEDICA TRANSILVANICA March 2010; 2(1):210-211

The melting section, where it was found most exceeded permissible levels of lead in workplace air were determined statistically significant differences.

Subjects with PbS above the permissible tolerable in the study group, the department melting had increased on average 72% of sample subjects A1 and A2 sample 80% of subjects. Average values were calculated PbS (sample A1 56.333 ± 7.935 mg / dl; sample A2 54.813 ± 8.436 mg / dl), PbU (sample A1 235.222 ± 55.226 mg / l, sample A2 189.119 ± 52.860 mg / l) and DAL (sample A1 17.5833 ± 5.8033 mg / l, sample A2 13.9112 ± 4.6985 mg / l). No correlations were established between PbS in lot of study and PbS samples A1 and A2.

The mean increased PbS correlated positively with mean values of PbU ($p<0.01$, $t = 3.717$) and with the DAL ($p<0.01$, $t = 3.045$).

Subjects with PbU above the permissible tolerable average had increased to 70% of sample subjects A1 and A2 sample 72% of subjects. Average values were calculated PbS (sample A1 56.457 ± 8.016 mg / dl; sample A2 53.631 ± 10.946 mg / dl), PbU (sample A1 237.686 ± 53.988 mg / l, sample A2 201.884 ± 46.476 mg / l) and DAL (sample A1 17.9143 ± 5.5326 mg / l, sample A2 14.6394 ± 4.6720 mg / l). Mean PbU lot A increased positively correlated with average values of PbU samples A1 and A2 ($p<0.01$, $t = 2.997$) and DAL ($p<0.01$, $t = 2.698$).

Subjects with elevated DAL above the permissible tolerable average had increased to 70% of sample subjects A1 and A2 sample 90% of subjects. Average values were calculated PbS (sample A1 56.457 ± 8.016 mg / dl; sample A2 52.593 ± 10.308 mg / dl), PbU (sample A1 237.686 ± 53.988 mg / l, sample A2 187.490 ± 50.865 mg / l) and DAL (sample A1 17.9143 ± 5.5326 mg / l, sample A2 13.6942 ± 4.7025 mg / l). Mean increased DAL in subjects lot A are positively correlated with average values of PbU samples A1 and A2 ($p<0.01$, $t = 4.263$) and with the DAL samples A1 and A2 ($p<0.01$, $t = 3.685$). A trend of positive statistical correlation was found between DAL and PbS of lot A, samples A1 and samples A2 ($p = 0.071$, $t = 1.828$).

For the sample A1 were calculated lowest average values of hemoglobin. There were no statistically significant correlations could be established between the two samples A1 and A2 in the hemoglobin and increased PbS, PbU and DAL. The lowest mean hemoglobin (13.428 ± 1.710 g / dl) is observed for sample A1 at elevated PbS. The increased sample A1 subjects PbS showing low hemoglobin values are in numbers higher than those of sample A2 ($p = 0.032$). In the average hemoglobin A2 is observed that the sample subjects had lower values compared with those of sample A1, if these values fall within the normal range ($p = 0.008$). In subjects with elevated PbU, the number of subjects and the mean hemoglobin (Hb), the range of normal and low, it is noted that sample A2 subjects have lower values compared with those of sample A1, if these values fall within the normal range ($p = 0.028$). In subjects with elevated DAL, the number of subjects and the mean hemoglobin (Hb), the range of normal and low values have been established between A1 and A2 samples with statistically significant correlations. The increased DAL sample A1 subjects showing low hemoglobin values are in numbers higher than those of sample A2 ($p = 0.032$). In the average hemoglobin A2 is observed that the sample subjects had lower values compared with those of sample A1, if these values fall within the normal range ($p = 0.008$).

For the sample A1 were calculated lowest average values of hematocrit. Between the two samples A1 and A2 were determined statistically significant correlation in the hematocrit values and PbS increased ($p<0.01$), PbU ($p<0.01$) and DAL ($p<0.01$). The lowest mean hematocrit (40.84 ± 4.10 %) is observed for sample A1 at elevated PbS. Statistically significant correlations were established in samples A1 and A2 in subjects with elevated PbS, the number of subjects and the mean hematocrit (Htc), the range of normal and low. The increased sample A1 subjects PbS showing low hematocrit values are a number higher than those of sample A2 ($p = 0.008$). In the average hematocrit is observed that sample A2 subjects had increased values compared with those of sample A1, the two samples could not be determined a statistically significant correlation. The increased sample A1 PbU subjects showing low hematocrit values are a number higher than those of sample A2 ($p = 0.030$). In the average hematocrit is observed that sample A2 subjects had increased values compared with those of sample A1, the two samples could not be determined a statistically significant correlation. The increased DAL sample A1 subjects showing low hematocrit values are a number higher than those of sample A2 ($p = 0.032$). In the average hematocrit is observed that sample A2 subjects had increased values compared with those of sample A1, the two samples could not be determined a statistically significant correlation.

Therefore we can say that the presence of chronic alcohol consumption is what determines the high blood lead level to sample A1. If co-exposure to inorganic lead and ethanol, PbS increase in subjects working in departments with training and direct exposure showing the most elevated concentrations of lead in workplace air (Melting).

Although higher mean values were found for chronic alcohol consumers, however, is associated with increased growth PbS, PbU and DAL only the chronic occupational exposure to inorganic lead.

Higher average values were found for chronic alcohol consumers in the PbU and DAL, which are influenced only by chronic occupational exposure to inorganic lead.

Mean hemoglobin and hematocrit were lower in the sample A1, there are correlations with statistical significance in subjects who had elevated PbS.

BIBLIOGRAPHY

1. Flora S, Dube S. Modulatory effects of alcohol ingestion on the toxicology of heavy metals. Ind J Pharmacy, 1994;240-248.
2. Bortoli A, Mattel A. ALA-D activity in exposed workers and in patients with alcoholic liver disease. Toxicol Let, 1980;1:209-210.
3. Shaper A. Pocock S. Effects of alcohol and smoking on blood lead in middle aged men. Br Med J, 1982;284:299-302.
4. Dally S, Giro C. High blood levels in alcoholics: wine vs beer. Drug Alcohol Depend, 1989:23:45-48.