OCCUPATIONAL AND ENVIRONMENTAL EXPOSURE TO LEAD AND INDICATORS OF ITS BIOLOGICAL EFFECT

Fat L[1], Gyorffy L[2], Ghiurca M[2]
[1]*Institute of Public Health, Cluj-Napoca, Romania*
[2]*District Hospital, Cluj-Napoca, Romania*

Key words: lead exposure, bio-toxicological investigation, human health

Objectives: The medical literature shows that both occupational and environmental exposure to lead affect the human health. Once in organism, lead initial produce the physiological absorption state, then the high absorption state that can be diagnosticated using toxicological investigations. Clinical manifestations appear when the absorbed lead is higher than the eliminated lead, generating the acute or chronic intoxication. The transition from one state to another depends on the exposure time and noxes concentration. The aim of this study is to analyze comparative, using some specific and precocious affected biological indicators, two groups of people occupationally and environmentally exposed to lead.

Methods: We investigated 195 workers from the "melting" sector of a non-ferrous metallurgical plant with the mean age = 31.81±8.19 years and the meantime of exposure = 9.03±6.67 years, and 255 people who work in the administrative sector of the same factory and live in the proximity, with the mean age = 35.66±8.49 years and the meantime of exposure = 7.73±6.16 years. We made clinical exam, bio-toxicological investigations, urinary δ-aminolevulinic acid (ALA-u), zinc protoporphyrin (ZPP), standard questionnaires regarding the effects of lead on the human organism, neurological and psychological examination. The air lead exceeded 71.3 times the maximum accepted values.

Results: We found high values of ZPP, over 10 μg/l, in 78.6% exposed workers and 28.2% people from the environmental group. In the environmental group (aged 20–35 years and length of service under 5 years) 19.1% had ZPP over 10 μg/l. High values of ALA-u, over 10 mg/l, were found in 68.1% of the exposed workers and 27.4% from the environmental group. In the group aged 20–35 years and length of service under 5 years, 62.9% workers and 16.6% controls

had values over 10 mg/l. There were concordance between ZPP and ALA-u values ($r = 0.567$, $p < 0.001$).

Conclusions: There were significant differences between the exposed and control group regarding the values of the intoxication marker ZPP ($p < 0.001$) and also for the values of ALA-u, which is specific for the lead intoxication ($p < 0.001$). There were also significant differences regarding ZPP and ALA-u values between the two groups (aged 20–35 years and working length under 5 years) ($p < 0.001$). The most affected and sensitive were the younger people. The general and professional morbidity correspond with the clinical and toxicological data.