CUMULATED INTERNAL DOSE OF METALS AND PULMONARY FUNCTION AMONG METAL EXPOSED WORKERS

Rocío Capelo, Universidad de Huelva, Spain
Miguel Ángel García, Universidad de Huelva, Spain
María Díaz-Santos, Universidad de Huelva, Spain
Rocío Jara, Universidad de Huelva, Spain
Antonio Pereira, Hospital Juan Ramón Jiménez, Spain
José Antonio Maldonado, Hospital Juan Ramón Jiménez, Spain
Amanda Gago, Universidad de Huelva, Spain
Tamara García, Universidad de Huelva, Spain
Jose Luis Gómez-Ariza, Universidad de Huelva, Spain
Juan Alguacil, Universidad de Huelva, Spain

Background: Inhalation of metals might be toxic to the respiratory system. Metal/chemical industries are important sources of exposure to metals via direct inhalation to the lungs. We studied the relationship between cumulative internal dose of metals and pulmonary function (spirometry) among a group of workers exposed to metals.

Methods: We obtained results of toenail metal levels and spirometry in 55 volunteer workers from the chemical/metal industry and 42 unexposed service workers. Forced vital capacity (FVC), forced expiratory volume in one second (FEV1), peak expiratory flow (PEF), and forced expiratory flow at 25-75% of forced vital capacity (FEF25-75) were measured with a portable spirometer. Toenail metal levels were measured by multielemental analysis with emission spectroscopy by ICP-MS. Comparison of the median of metal levels between two categories of qualitative variables was tested using the U Mann-Whitney test. The correlation between each metal and the spirometry parameters was estimated with the Spearman’s rho.

Results: Molybdenum levels correlated inversely with the percentages of VEF1 (p=0.015), PEF (p=0.009), FEF25-75 (p=0.008), and the FEV1/FVC ratio (p=0.019), and with the FEV1/FVC ratio (p=0.019); while manganese also correlated inversely with the percentage of PEF (p=0.039). Cumulative internal dose of vanadium were associated with the presence of an obstructive pattern (p=0.002), with a FEV1 percentage lower than 80% (p=0.008), with a FEV1/FVC ratio lower than 70% (p=0.0001), and with a percentage of FEF25-75 lower than 60% (p=0.011). Similar associations were observed for manganese, molybdenum and cobalt. Chromium levels were associated to a lesser extent with the same parameters, and resulted also associated with the lack of presence of a restrictive pattern (p=0.048).

Conclusions: We observed individual associations between the cumulative internal dose of vanadium, molybdenum, manganese, cadmium, lead and cobalt, and pulmonary function.