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The influence of heavy metals and trace elements on comatose patients with severe traumatic brain injury in the first week of admission

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Purpose: The aim of this study is to investigate the possible role of heavy metals (lead and cadmium) and imbalance of trace elements (chromium, iron, zinc, copper, and manganese) in death among patients with severe traumatic brain injury. **Material and Methods.** A case-control study was conducted with 64 comatose patients with severe TBI, in the Department of Anesthesiology and Reanimation, Ibn Sina University Hospital and Hospital of Specialties in Rabat, Morocco; 22 healthy volunteers were recruited in Blood Transfusion Center of Rabat. Blood samples were collected from TBI patients, in the first week (3h after admission and each 48h during one week) and from healthy volunteers one time. Concentration of heavy metals and trace elements in serum was determined by electrochemical atomic absorption spectrometry. Statistical analysis was performed using Statistical software (SPSS) and the cases and controls were compared using the Mann–Whitney U test and Student’s t-test for cadmium according to gender and final evolution. A P-value $<<0.05$ was considered to be statistically significant. **Results.** Our data showed that the difference of heavy metals concentration (lead and cadmium) between patients and healthy subjects was not statistically significant. However, the difference of some trace elements concentration (iron, copper, chromium, and selenium) between patients and healthy subjects was statistically significant. According to the final evolution, the concentration of manganese was higher in dead patients and statistically significant ($p = 0.04$) for heavy metals; the concentration of lead was not statistically significant while the concentration in cadmium was statistically significant ($p = 0.004$). By sex, lead and cadmium were statistically significant, respectively $p = 0.02$, $p = 0.001$, and cadmium was higher in women, while lead was higher in men. **Conclusion.** Among all studied heavy metals (lead and cadmium) and trace elements (iron, zinc, copper, selenium, chromium, and manganese), manganese and cadmium may play a role in the death of patients from severe traumatic brain injury.