

TOXICOLOGICAL STUDIES ON LEVELS OF HEAVY METALS IN BIOLOGICAL MATERIALS IN CHILDREN

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The state of health of children can serve as an indicator of the ecological situation of a region. The study of trace elements accumulating in the human body allows their quantitative parameters to be used as biological markers in the hygienic diagnosis of trace element disorders and environmentally related diseases.

We conducted a toxicological study of biological materials from 100 children in two localities of the Ton District of the Issyk-Kul Region – villages Bokonbaevo and Kaji-Sai. The age range of children was 8-10 years. A total of 73 blood samples and 100 urine samples were tested. Determination of trace elements levels in biological materials was made by I²-S method at the laboratory of the Alex Stewart Ltd. 22 elements were determined in the urine and 21 elements in blood. This work was supported by INTAS (No. 97-0842).

Significant differences in levels of particular trace elements were found in blood and urine of children from the two locations. These data were compared with natural levels of some elements in human blood and urine (O.G. Arkhipova, 1988) and allowable concentrations by Russian standards on lead, cadmium, nickel belonging to the first and second hazard class. Results of toxicological tests of biological materials were also compared in boys and girls from v. Bokonbaevo and v. Kaji-Sai.

Comparison with the existing standard on lead (0.04 mg/L) showed that urinary lead concentrations in children exceeded the standard by 1.2-1.7 times and they were higher in boys and girls from v. Bokonbaevo than v. Kaji-Sai. The nickel levels in urine were 0.01— 0.02 mg/L in boys and girls from both locations.

There was a significant difference in urinary iron concentration in boys ($t = 3,9$) which was 2 less in boys from v. Kaji-Sai compared to v. Bokonbaevo. The urinary barium concentration was 1.6 times higher in girls from v. Kaji-Sai than v. Bokonbaevo. Urinary concentrations of molybdenum, lead, copper were significantly higher in children from v. Bokonbaevo.

The analysis of concentrations of elements in blood showed that boys had significant differences for 4 elements (chromium, barium, cadmium and calcium) and girls had significant differences for eight elements (chromium, cadmium, calcium, copper, manganese, molybdenum, lead, vanadium). Blood calcium levels were significantly lower both in boys and girls from v. Kaji-Sai than v. Bokonbaevo.

In conclusion, our results show that concentrations of such important elements as calcium and iron were significantly lower in children from v. Kaji-Sai than v. Bokonbaevo. The data of our study can be used for developing regional normative values and identification of natural contents of some elements in children's blood and urine depending on ecological-hygienic characteristics of individual areas.