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CONSEQUENCES OF THE LOW-LEVEL ENVIRONMENTAL LEAD EXPOSURE OF URBAN PRESCHOOL CHILDREN

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The general objectives of the study was to measure PbB in preschool children from central and residential areas of non-industrial city; determine the prevalence of elevated blood lead in preschool children; identify the main effects of chronic Pb exposure on the cognitive development during the first 6 years of life. A case-control study population has been chosen: two groups of 56 preschool children (aged 5-7 years) have been formed, from "polluted" central and "clean" residential zones of the city respectively. PbBs in children were evaluated by the atomic absorption spectrophotometry method.

Though children from central and residential areas had got drinking water from different reservoirs there was no significant difference in the annual average Pb content in drinking water of two groups of children: the values were lower than standard (10 μg/l) and ranged from 5,6-8,0 μg/l. Annual average air Pb concentrations were 7 times higher in an old part of the city 0,0696 μг/м^3 vs. 0,0091 μг/м^3 in, $p<0,001$, and sometimes at summer-autumn period ranged from 1,5 to 2 standard levels. Pb concentrations of soils in central and residential areas were respectively 30,1±5,6 mg/kg and 10,7±1,7 mg/kg, $pt<0,001$, the range 2,7-75,0 mg/kg. The correlation index of Pb soil and annual average air concentrations - $r=+0,57$, $p=0,004$, and as for the air Pb levels in summer-autumn period - $r=+0,69$, $p=0,003$. There was no difference in food habits of the observed children.

Children residing in the central part of the city with relatively higher Pb air and soil concentrations (which mainly not exceed the allowable levels) in comparison with those in residential area, are at significant risk of the higher PbB (12,2±1,8 vs. 8,1±0,9 μg/dl, $p<0,05$): AR=0,52, RR=2,8 (95%CI: 1,3-6,4), OR=9,7 (95%CI: 2,8-34,0), χ^2=7,15. The correlation coefficient between PbBs in children and soil Pb content – r=+0,32, $p<0,05$. In order to determine possible association between the indicators of Pb exposure and the neuropsychological parameters the group of 32 preschool children with relatively elevated PbBs (>9,9 μg/dl) and the control group (PbBs <= 9,9 μg/dl, n=24) were formed. Haemoglobin levels ranged between 12,26-12,58 g/dl, with no difference in groups, but an increase of the δ-aminolevulinic acid urinary excretion (4,46±0,31 vs. 3,20±0,27 μmol/l) was detected in children with elevated PbB ($pt<0,05$). The correlation coefficient between the PbB and the δ-aminolevulinic acid urinary excretion levels in children - r=0,51, $p<0,05$. In comparison with the control group the exposed children were at significant risk as for the neuropsychological disorders appearance: Neural system astenization symptoms (RR=6,0 (95%CI: 1,5-23,7), delay of cognitive development abilities (analytical, logical mentality; ability to compare etc) (RR=3,3 (95%CI: 0,9-4,1), enuresis nocturnal (for PbBs>17 μg/dl) (RR=5,3 (95%CI: 1,3-21,9).

The data for a group of 56 children residing in the non-industrial city indicate that the PbB of up to 57 per cent of the children are 10 μg/dl or higher, that's why even in a very low-level exposed area it is worthwhile looking for children at risk, first of all due to neuropsychological disorders.