ABSTRACT

Lead exposure poses a major environmental health problem in India, where direct studies on a large-scale have not yet been performed to investigate its impact on the intelligence quotient, neurobehavioral development, status of anemia and growth of children.

This cross-sectional epidemiological study was done to resolve the above purpose and to determine the health effects of lead exposure on children aged 3 – 7 years attending specific public schools. The schools were chosen to represent different traffic and industrial density areas in Chennai.

The study sample constituted 814 children to whom the standard IQ and neurobehavioral tests were administered. Behavioral rating questionnaires were administered to the respective teachers. Socio-demographic and economic data were collected from each child’s primary caregiver. Fresh whole blood samples collected from the children was tested for lead, complete blood count and serum ferritin concentrations.

The resultant data was analyzed using SPSS version 13.0 and R version 2.5.1. The mean blood lead was 11.5 µg/dL and 54.5% of the study population had blood lead levels above 10 µg/dL. Low standard of living, residence in high industry/high traffic zone and use of brass or bronze vessels correlated significantly with high blood lead levels.

After adjusting for confounding factors, every 10 µg/dL increase of blood lead level resulted in a decrease of 2.83 IQ points, 5.42 points in visual-motor abilities scale and an increase of 2.2 points on the inattentiveness scale and 6.97 points on the global executive functions scale. Non-linear association was also
observed between blood lead levels and IQ and neurobehavioral development. Steepest declines in IQ and neurobehavioral development were seen at blood lead levels below 5 µg/dL.

A significant increase in mean blood lead concentration was observed with the development of iron deficiency anemia from one phase to another. However, anemia was more prominent in children with blood lead levels above 10 µg/dL. A possible decrease in height and increase in body mass index was also observed with increasing blood lead levels.

Thus, this study concludes that there is no “safe” level of lead in the blood and time has now come to take every possible serious action to curb lead pollution and protect our young buds from withering due to reduced cognitive functions and other health hazards.