

Lead Pollution and Lead Poisoning among Children in China

Yuxin Zheng M.D. Ph.D.

National Institute of Occupational Health and Poison Control, Chinese Center for Disease Control and Prevention, No 29, Nanwei Rd, Beijing, 100050, China Tel: 8610-63047639 Fax 8610-63014323 Email:yxzheng@163bj.com

Abstract

Lead is ubiquitous in the human environment as a result of industrialization. China's rapid industrialization and traffic growth have increased the potential for lead emissions. Lead poisoning in children is one of the most common public health problems today, and it is entirely preventable. Children are more vulnerable to lead pollution and lead in their bodies can affect their nervous, circulatory, and digestive systems. Children are exposed to lead from different sources (such as paint, gasoline, and solder) and through different pathways (such as air, food, water, dust, and soil). Although all children are exposed to some lead from food, air, dust, and soil, some children are exposed to high dose sources of lead. Significant sources of lead for China's children include industrial emissions (often close to housing and schools), leaded gasoline, and occupational exposure that occurs when parents wear lead-contaminated clothing home from work, burning of coal for home heat and cooking, contaminated food, and some traditional medicines.

To assess the blood lead level in children in China, a large-scale study was conducted in 19 cities among 9 provinces during 1997 to 2000. There were 6502 children, aged 3-5 years, were recruited in the study. The result indicates that the mean blood lead level was 8.83ug/dl 3-5 year old living in city area. The mean blood lead level of boys was higher than that of girls (9.11ug/dl vs 8.73ug/dl). Almost 30 percent childrens blood lead level exceeded 10ug/dl. The average blood lead level was higher than that of in 1985 (8.83ug/dl vs 8.1ug/dl).

An epidemiological study was carried on the children living around the cottage industries recycling the lead from battery. Nine hundreds fifty nine children, aged 5-12 years, living in lead polluted villages where the lead smelters located near the residential area and 207 control children live in unpolluted area were recruited in the study. The lead levels in air, soil, drinking water and crops were measured. The blood lead and ZnPP level were tested for all subjects. The results show that the local environment was polluted. The lead levels both in the air and crops were much higher than that of in control area. In the polluted area, the average blood level was 49.6ug/dl (rang 19.5-89.3ug/dl). Whereas, in the unpolluted area, the average blood level was 12.4ug/dl (rang 4.6-24.8ug/dl). This study indicates that in some countryside area, some cottage industries induce seriously lead pollution and cause children health problem.

For the introducing of unleaded gasoline in some large cities, such as Beijing and Shanghai, the blood lead level showed a declined trend since 1997. By 2000, the use of leaded gasoline in motor vehicles has been prohibited in China. The most recent data available show that levels of lead in blood among children in Shanghai decreased from 8.3ug/dl in 1997 to 7.6ug/dl in 1999. The prevalence rate of children lead poisoning (blood lead >10ug/dl) was also decreased from 37.8% to 24.8%. In children living in downtown area, the blood lead level reduced dramatically. To explore the relationship between gene polymorphisms and individual susceptibility of lead poisoning, a molecular epidemiological study was conducted among children living in lead polluted environment. The result showed that the subjects with ALAD2 allele has higher ZPP level, and the subjects with VDR B allele has larger head circumference than only with b allele. In the present study, we demonstrated that ALAD genotypes modify lead effects on heme metabolism and VDR gene variants influence the skull development in highly exposed children. The polymorphism of ALAD and VDR genes might be the molecular inherited factor modifying the susceptibility of lead poisoning.

Recently, Chinese government pays more attention to lead pollution and lead poisoning in children problem. The leaded gasoline was prohibited used in motor vehicles since 2000. The government has decided to have a clampdown on the high-polluted lead smelters for recycling the lead from battery in countryside. It is hopeful that the risk of lead poisoning in children will be decreased in the further.

Key words : Lead pollution Lead poisoning Children