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Study on the Concentration and Influence Factor of Organo-Chlorine Pesticides in Breast Milk from Three Cities in China

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Since 1970s, organo-chlorine pesticides (OCPs) have been banned from production and use in most of countries due to its long half-life, global distribution and high toxicity to human health. However, OCPs can remain in soil, groundwater, surface water and sediments due to its special stability, and transfer between different geological environmental media due to its semi-volatile property. Finally, OCPs will accumulate in human beings through food chain.

The concentration of OCPs in breast milk is a very important index to evaluate residual level of OCPs in the environment, and was used for estimating the mothers' body burden and the infants' daily intake. 120 human breast milk samples were collected from mothers in Beijing, Hangzhou, Zhejiang Province and Nanjing, Jiangsu Province.

The hexachlorobenzene (HCB), hexachlorocyclohexane (HCH) and dichlorodiphenyltrichloroethane (DDT) (including α -HCH, β -HCH, γ -HCH, δ -HCH, p,p' -DDE, p,p' -DDD, o,p' -DDT, and p,p' -DDT) contents of the samples were determined by gas chromatography/electron capture detection. The HCB, β -HCH and p,p' -DDE all were detected at rates of 100%. The average residue levels of HCB were 55.0 $\mu\text{g}/\text{kg}$ fat in breast milk from Beijing, 65.0 $\mu\text{g}/\text{kg}$ fat in breast milk from Hangzhou, and 75.8 $\mu\text{g}/\text{kg}$ fat in breast milk from Nanjing. The average residue levels of β -HCH were 170.6 $\mu\text{g}/\text{kg}$ fat in breast milk from Beijing, 286.2 $\mu\text{g}/\text{kg}$ fat in breast milk from Hangzhou, and 183.3 $\mu\text{g}/\text{kg}$ fat in breast milk from Nanjing. The average residue levels of p,p' -DDE were 322.8 $\mu\text{g}/\text{kg}$ fat in breast milk from Beijing, 824.8 $\mu\text{g}/\text{kg}$ fat in breast milk from Hangzhou, and 381.4 $\mu\text{g}/\text{kg}$ fat in breast milk from Nanjing.

The results showed that the infants' daily intake level of HCB exceed the WHO TDI value (0.17 $\mu\text{g}/\text{kg}$ body weight/day for non-cancer effects), which were 0.20 $\mu\text{g}/\text{kg}$ /day for Beijing, 0.29 $\mu\text{g}/\text{kg}$ /day for Nanjing, and 0.30 $\mu\text{g}/\text{kg}$ /day for Hangzhou. In our study, both the OCPs body burden of the sample population and estimated daily OCPs intake of breast-feeding infants were higher than those of developed countries. In order to determine the influencing factors on the higher residual levels of OCPs in breast milk from Hangzhou and Nanjing, soil sediment samples from the three cities were sampled and analyzed for OCPs. Our result suggested that: 1) the higher concentrations of OCPs all were detected in soil and sediment of Hangzhou and Nanjing. A positive correlation was observed between concentration of p,p' -DDE in human milk and that in the shallow geological environment, such as soil and sediments. This suggested that concentration of OCPs in the environment could play an important part in influencing OCPs burdens in lactating women; 2) the total residual levels of OCPs in breast milk from three cities all were decreased; 3) the exposure risk of OCPs for people at the inland city was lower than those from other coastal and heavy industrial cities in China.

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