Dioxins and related compounds in human breast milk collected around open dumping sites in Asian developing countries: Bovine milk as a potential source

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Abstract: In this study, concentrations of dioxins and related compounds (DRCs)-such as polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans, and coplanar polychlorinated biphenyls-were found in human breast milk from women living near dumping sites of municipal waste and reference sites in India, Cambodia, Vietnam, and the Philippines during 1999 to 2000. DRCs were detected in all human breast milk samples analyzed, demonstrating that residents in these Asian developing countries have been exposed to these contaminants. In India, the concentrations of DRCs in human breast milk from women living near the investigated dumping site were notably higher than those from women living near reference sites and from women in other Asian developing countries. Toxic equivalent quantity (TEQ) levels of DRCs were comparable with or higher than those reported in the general populations of developed countries since 1990. In contrast, levels of these contaminants in human breast milk in women from Cambodia and Vietnam were not significantly different between milk from women living near the dumping and reference sites. These results indicate that significant pollution sources for DRCs are present in Indian dumping sites and that residents there have been exposed to relatively higher levels of these contaminants. TEQ levels in human breast milk from the dumping site in India tended to decrease with an increase in the number of previous deliveries by mothers, whereas no significant relationship was observed in Cambodia, Vietnam, or the Philippines. This suggests that mothers who have been exposed to relatively high levels of DRCs transfer greater amounts of these contaminants to the first infant than later ones through breast-feeding, which in turn implies that the first children of these mothers might be at higher risk from DRCs. When the residue levels of DRCs in bovine milk collected from the Indian dumping site and reference sites were examined, TEQ levels in bovine milk from the dumping site were higher than those from reference sites. This result suggests that bovine milk is a potential source of DRCs for residents living near the dumping site in India. To our knowledge, this is the first comprehensive study on exposure to DRCs of residents living in proximity to open dumping sites of municipal waste in Asian developing countries.

Index Keywords: dioxin; polychlorinated biphenyl derivative; polychlorinated dibenzodioxin; polychlorinated dibenzofuran; bioaccumulation; dioxin; milk; PCDD; pollution exposure; waste facility; adult; article; breast milk; controlled study; dumping; environmental exposure; female; human; major clinical study; municipal solid waste; priority journal; toxicokinetics; Adolescent; Adult; Animals; Asia; Data Collection; Developing Countries; Dioxins; Environmental Exposure; Environmental Monitoring;

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