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Naturally-occurred cadmium contamination in the environment

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Cadmium (Cd) is a toxic trace metal to human being. Most of publications focused on the environmental pollution caused by the anthropogenic sources, such as industrial and agricultural activities, metal mining and smelting. However, in various parts of the world, high Cd concentrations in the environment are not related to anthropogenic contamination but have geogenic origins. Geochemical weathering of parent rocks is the original sources of trace metals in soils, while the parent materials enrich toxic trace metals may lead to contamination of soil environment, consequently threaten the safety of food stuffs and health risk of local inhabitants. In the Jianping area located in the Three Gorges region, China, soil Cd ranged from 0.12 to 42 mg/kg, and the natural soils (forest soils and in-situ weathering soils) also posed high Cd contents (0.12-8.5 mg/kg), which dominated source was thought to be geological weathering of Cd-rich black rock series, and the mining and utilization of local stone coal in the history aggravated the accumulation of Cd in soils. The sediment samples of Yangtze River adjacent to Jianping area also posed elevated Cd content, therefore, geochemical weathering of the study area may be an important natural sources to the high Cd anomaly of upriver of Yangtze River basin. The high Cd content in soils induced the enrichment of Cd in the local planted food crops, which the average Cd concentrations of local vegetables are 0.68 mg/kg (fresh weight). The daily Cd intake of local population was estimated at 260 μg/day, four times the reference dose (60 μg/day) for a 60 kg adult. Ingestion of Cd-rich vegetables was the dominated exposure path. High daily Cd intake induced the accumulation of it in the body of residents, and the average urinary Cd concentrations of local residents were raised to 4.3 μg/L. Such that the natural-occurring Cd also posed potential health risk to local public, which was overlooked in the past. Therefore, more attentions should be paid in the areas with high Cd background values, especially in the regions where black rock series and black shale outcropped.

Keywords: Cadmium; geogenic source; exposure; health risk