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Manganese and Other Geothermal Minerals Exposure to Residents in Ketenger Village, Banyumas, Indonesia

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Abstract : Manganese (Mn) is one of the potential contaminants minerals geothermal water. Preliminary studies conducted in Ketenger village, the nearest village with Baturaden hot spring, showed that the concentration of Mn in water supply has exceeded the reference value. Mineral contamination problem in Ketenger village is not only Mn, but also other potential geothermal minerals, such as chromium (Cr), iron (Fe), sulfide (S2-), nickel (Ni), cobalt (Co), and zinc (Zn). It becomes a concern because generally the residents still use ground water as the water source for their daily needs, including drinking and cooking. Therefore, this study aimed to determine the distribution of mineral contamination in drinking water and food and to estimate the health risks possibility from the exposure. Four minerals (Mn, Fe, S2-, and Cr6+) were analyzed in drinking water, carbohydrate sources, vegetables, fishes, and fruits. The test results indicate that Mn concentration in drinking water is 0.35 mg/L, has exceeded the maximum contaminant level (MCL) according to the US EPA (MCL = 0.005 mg/L), whereas other minerals still comply with the standards. In addition, we found that the average of Mn concentration in the carbohydrate sources is quite high (1.87 mg/Kg). Measurement results in Chronic Daily Intake (CDI) and the Risk Quotient (RQ) found that exposure to manganese and other geothermal minerals in drinking water and food are safe from the non-carcinogenic effects in each age group (RQ<1). So, geothermal mineral concentrations in drinking water and food has no effect on non-carcinogenic risk in Ketenger's residents because of CDI is also influenced by other parameters such as the duration of exposure and the rate of consumption. However, it was found that intake of essential minerals (Mn and Fe) are deficient in every age group. So that, the addition of Mn and Fe intake is recommended.

Keywords : CDI, contaminant, geothermal minerals, manganese, RQ
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