



Natural radioactivity levels in commercialized bottled drinking water and their radiological quality assessment

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ABSTRACT

This work presents radiological data on most commonly sold bottled water brands in the urban areas of Bangladesh. A significant fragment of the population use bottled water as their source of daily water intake. It is known from the literature that some varieties of bottled waters contain natural radionuclides in higher concentration than the traditional municipal tap water. In this study, concentrations of naturally occurring radioactive materials, particularly ²²⁶Ra, ²²⁸Ra, and ⁴⁰K, and its annual effective dose with its stochastic effects were determined in available brands of bottled mineral water manufactured in Bangladesh. The measurement was performed by gamma-ray spectroscopy using a hyper-pure germanium detector. The activity concentration of the radiologically important nuclides ²²⁶Ra and ²²⁸Ra were found within the permissible limits of 1 and 0.1 Bq l⁻¹, respectively, recommended by World Health Organization (WHO) in almost all samples. The annual effective doses caused by natural radioactivity of ²²⁸Ra for the infants (0–1 year) and adolescent (12–17 year) groups exceeded the recommended WHO guideline level of 0.1 mSv y⁻¹ for drinking water in most of the cases. Particularly for those age groups, the estimated doses are extremely high. In general, the carcinogenic risk due to natural radioactive doses for all bottled water samples were found below the acceptable limit of 10⁻³.

Keywords: Bottled water; Natural radioactivity; HPGe γ -ray spectrometry; Annual effective dose; Lifetime cancer risk

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