

Minerals in tap water and bottled waters and their impact on human health

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ABSTRACT

The aim of the study was to determine the doses of selected bioelements delivered to the body as a result of consuming water from various types of intakes (surface water from the river, water from infiltration wells, treated water directed to the water supply system) and additionally as a result of using bottled water. The present study analysed the content of 33 elements in water, grouped into microelements, ultratrace elements and other elements found in the aquatic environment. The majority of those elements are essential to proper human development and functioning. They can enter the human body together with water: (a) ingested directly, (b) present in food, (c) inhaled or (d) absorbed through skin. The results obtained were compared with the chemical composition of 29 types of bottled water (mineral and spring water) available in the retail market. Reference doses for each of the parameters were calculated in accordance with the US EPA guidelines and compared with the doses recommended in other research studies. Two water treatment plants (WTPs and WTPss) located in southern Poland were selected as research facilities. Water treatment plants treat surface water from rivers and groundwater from infiltration wells using sand filters. It was found that the average mineralisation of water supplied in the water distribution system ranges from 0.15 to 0.2 mg dm⁻³, which indicates that it has characteristics of natural low-mineral spring water. It provides 0.0001%–0.0003% of the recommended daily intake (RDI) for Al, As, Cd, Co, Cr, Cu, Mn, Mo, Ni, P, and Sn for children and for adults. The novelty of the article is the determination of the doses of microelements in bottled water. Bottled mineral water provides considerably higher doses of microelements than the values stemming from the RDI. The delivered doses of carcinogenic and potentially carcinogenic elements are of particular importance. In the case of Al, Cr, and Ni, the total recommended dose was exceeded 1 to 2 times for children and 1.5–7 times for adults. It was demonstrated that consumers should be careful about drinking water with an elevated content of microelements that are characterized by a very small, yet critical difference between the reference dose and the recommended dose.

Keywords: Bottled water; Health safety; Microelements and ultratrace elements; Tap water

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