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Health risk assessment of heavy metal variability in sachet water sold in Ado-Odo Ota, South-Western Nigeria

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Abstract

The sales of sachet water (SW), also known as “pure water” (PW), in Nigeria is a lucrative business. It serves many people, especially low-income earners, by providing a more affordable access to safe drinking water when compared with table water. However, some of the producers of SW do not effectively treat raw water before packaging them for sale. This study investigates the presence and concentrations of heavy metals, such as chromium (Cr), iron (Fe), manganese (Mn), copper (Cu), aluminum (Al), and zinc (Zn) in some samples of SW sold within Ota, Ogun State, Nigeria. Samples of SW from nine different producers were purchased for four consecutive weeks and analyzed to determine the concentrations of these heavy metals in them. Furthermore, health risk indicators, such as chronic daily intake (CDI) and health risk indices (HRI) for children and adults, were calculated separately. The metal concentrations were compared with allowable limits set by the World Health Organization (WHO), Nigerian Industrial Standard (NIS), and the United States Environmental Protection Agency (US EPA). High concentrations of Cr, Fe, and Al were found in all the nine samples and exceeded the maximum allowable limits (MAL) of all the standards considered. However, the concentrations of Zn, Mn, and Cu were within permissible limits. The HRIs of heavy metals were in the order of $Cu > Fe > Zn > Mn > Al > Cr$, but since the standard limits set for some metals were exceeded, proper and effective treatment is required to safeguard the health of consumers.

Keywords

Heavy metals Sachet water Health risk Large gathering Water quality

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