



Comments on “Uranium standards in drinking water: an examination from scientific and socio-economic standpoints of India”

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The authors of this paper (Jha et al. 2024) have tried to justify the uranium standards in drinking water (60 µg/L) of India adopted by the Atomic Energy Regulatory Board (AERB) based on radiological toxicity. All these authors belong to Bhabha Atomic Research Centre (BARC), Department of Atomic Energy (DAE), and they tried to justify the guidelines adopted by their sister organization under DAE with some ulterior motive.

A careful reading of authors' paper reveals some contradictions which are so obvious, hence this rejoinder. In the abstract, authors state: “The detection of uranium in drinking water has ignited concerns among the public, regulators, and policymakers, particularly as around 1% of the 55,554 water samples in India have shown uranium levels surpassing the 60µg/L guideline established by the Atomic Energy Regulatory Board (AERB) based on radiological toxicity.”

But under section “Observations from nationwide survey,” the authors repeat a different story contradicting the abstract: “Out of 718 districts of the country, 403 districts in 23 States and 3 Union Territories are covered. Uranium and other water quality parameters have been measured in fifty-five thousand five hundred and fifty-four (55,554) samples....Uranium content in 98% of the samples was found to be less than 60 µg/L set by AERB, India. The pie-chart of the data is given in Fig. 6. From the figure, it can be observed that 93.9% and 97.8% of the data lie below the WHO guideline value of 30 µg/L and the AERB limit of 60 µg/L, respectively. It is observed that 2.2% of the samples had uranium concentrations > 60 µg/L in both pre-monsoon and post-monsoon seasons.”

My observation relates to this discrepancy in reporting the U content in water. Is it 1% or 2.2% above the AERB limit? The authors repeatedly point out to U content measured in 55,554 samples without giving reference to any source of their information. This is my second observation on the drawback of their paper.

Our investigations based on U data generated under World Bank Project “Toward Managing Rural Drinking Water Quality in the State of Punjab, India” (World Bank 2020) reveal an entirely different scenario of U content in groundwater of Punjab. During 2009–2016, Punjab Water Supply and Sanitation Department (PWSSD) surveyed 7036 habitations (villages) in Punjab for various types of groundwater contaminants. Water samples were analyzed using state of art instrumentation (ICP-MS & IC-MS) in sophisticated laboratory of PWSSD in Mohali, near Chandigarh. This laboratory is accredited by the National Board for Accreditation of Testing and Calibration Laboratories (NABL), India.

U content was measured in 3608 water samples with a variation from 0.10 ppb (µg/L) to 2277 ppb (µg/L) and an average value of 31.38 ppb (µg/L), which is higher than the WHO limit of 30 ppb. Our investigations revealed that 1145 (31.7%) of water samples, analyzed in Punjab, contain U equal or higher than WHO limit (30 µg/L); and 786 (21.8 %) samples have U content equal or higher than AERB limit of 60 µg/L. In the case of Malwa belt districts, known as the cancer belt of Punjab, the U content values are higher than the AERB limit in almost 50% samples. However, the three Malwa districts of Barnala, Fazilka, and Moga record higher U content than AERB limit (60 µg/L) in 90%, 78.3%, and 61.4% samples, respectively (Virk 2017; 2019a, 2019b). Hence, the results of U content in water presented by the authors (1% above AERB limit) are highly doubtful and need to be rescrutinized.

The authors have done an elaborate study of approaches to U content guideline values. In the section, “Global scenario on limit of uranium in drinking water,” they refer to

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WHO guidelines which are followed by many countries: “In its water quality guidelines, the World Health Organization (WHO) explicitly states that individual countries have the discretion to establish distinct national guideline values, taking into consideration specific parameters such as local geological conditions, socio-economic factors, the prevalence of uranium in the environment, and potential health risks to the population. Some country-specific guidelines deviate from the WHO's guideline value of 30 µg/L, with values either exceeding or falling below this threshold.”

It is strange that in India, we follow two different guidelines for U content in water. In section, “India specific Guideline Values,” authors try to denigrate BIS adopted guideline vis a vis AERB guideline for U content in water: “Recently, the Bureau of Indian Standards (BIS 2021) has adopted a national limit of 30µg/l, aligning with the WHO guideline value. It is noteworthy that in adopting these guidelines, BIS did not conduct health-based investigations specific to the Indian population, nor did it consider experimental and epidemiological studies, scientific and technical bases, or engage in remediation and cost–benefit analysis. Importantly, the Atomic Energy Regulatory Board (AERB), serving as the national regulator for radiological purposes, has established a national limit of 60µg/L based on the best scientific judgments. This limit may be deemed reasonable due to the following factors: a) the cost associated with reducing the concentration to extremely low levels cannot be justified by the corresponding benefits, and b) it is consistent with values prescribed by many other countries and aligns with recommendations from international organizations.”

Before concluding, I may refer to a wonderful study (Ansoborlo 2015) on comparison of chemical and radiochemical guidelines for U content in water. WHO guideline of 30 µg/L is based on chemical toxicity of U but AERB guideline of 60 µg/L is based on radiological toxicity only. It is a well-known fact that radiological toxicity of U at low levels can be ignored, but its chemical toxicity cannot be ignored; hence, the AERB guideline is not a safe limit for

Indians. My views find concurrence with studies carried out by Zamora et al. (2009) who revealed that at higher intake levels of uranium through drinking water, the chemical toxicity would be a greater health concern than radio toxicity.

Declarations

Conflict of interest The author declares no competing interests.

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