

## Naturally occurring hexavalent chromium in tap water of Ahmedabad city: Health perspective with respect to Public Health Goal

S. S. A. Zaidi, Jignesh Mochi, Krunal Patel and Henita Patel

National Institute of Occupational Health (NIOH), Indian Council of Medical Research (ICMR), India

**Background information:** Drinking water contamination with hexavalent chromium (Cr6+) either by natural or anthropogenic sources is an emerging global health problem. This issue got much impetus when Public Health Goal (PHG) proposed a maximum contamination limit (MCL) as low as 0.02 µg/l for Cr6+ against the current MCL for total chromium (50 µg/l, WHO). At present, Cr 6+ is an unregulated chemical; therefore, its monitoring and regulation deserve special attention. **Materials and Methods:** Ahmedabad city is the sixth largest city of India with a population more than 6.3 million. A general survey covering all the specified zones of Ahmedabad was carried out to examine naturally occurring Cr6+ in drinking water, obtained from Ahmedabad Municipal Corporation (AMC) and personal bore water supply. A total number of 415 drinking water samples (AMC, N=125; personal bore water, N=290) were analyzed for Cr6+ by ion chromatography employing US EPA method 218.6.

**Results:** A wide variation in the level of Cr6+ in drinking water was observed in bore water samples. The average value of Cr6+ was registered to be 14.57 µg/l (range 0.0 - 322.64 µg/l) with a median value of 6.39 µg/l. Cr6+ was not detected in about 19% of the bore well water samples (detection limit 0.3 ppb). On the contrary, AMC water supply had a considerably lower level of Cr 6+ (average 3.58µg/l, range 0.0 - 13.78 µg/l, median 2.58 µg/l) and it was not detected in 39.5% of the water samples. Seven bore water samples exceeded the maximum prescribed limit of WHO (50 µg/l). Relatively higher levels of Cr6+ in water samples were detected in the south and east zones of the city associated with industrial area as compared to non-industrial area.

**Discussion:** Data obtained in the present study are several hundreds to thousands-fold high than the suggested PHG (0.02µg/l) level of Cr 6+ as MCL. As the regulation of Cr6+ in drinking water is lacking at present, there have been great uncertainties of the risk assessment due to Cr6+ exposure. The general population ingesting Cr6+-contaminated drinking water might be at risk for developing chromium-induced health effects.

**Conclusion:** Cr6+ and its compounds are known carcinogens and need tight regulation. Data produced in this study might be useful for establishing revised MCL for Cr6+, which is lacking at present.

**Keywords:** Hexavalent chromium, Cr6+, PHG, Ionchromatography, Drinking water

### Biography

Syed Shakeel Ahmad Zaidi, Scientist E & Head, Department of Biochemistry, National Institute of Occupational Health, Meghaninagar, Ahmedabad-380016, Gujarat, India.

**Experience:** Around 25 years experience in the related field. Dr. Syed Published 30 articles (14 national and 16 international).

**Field of Specialization:** Pesticides Biochemistry and toxicology, Residues analysis by GC, Metal and solvent toxicity, Endocrinology and reproductive toxicity, Radio Immunoassay (RIA) for Hormones & neurotransmitters estimation, Ionchromatography (Dionex IC 2500) for trace and heavy metals analysis. Current specialization: Metals/ pesticides toxicity and metabolism RIA, biochemical/pathological analysis, Ion-chromatography.

shakeelzaidi@yahoo.co.in