

Occurrence of Li in groundwaters and plants from Dobrogea karst area, Romania

Anamaria Iulia Torok[‡], Ana Moldovan[‡], Erika Andrea Levei[‡], Oana Cadar[‡], Claudiu Tănăselia[‡], Oana Teodora Moldovan^{§,¶}

[‡] INCDO-INOE 2000, Research Institute for Analytical Instrumentation, Cluj-Napoca, Romania

[§] Emil Racovitza Institute of Speleology, Cluj-Napoca, Romania

[¶] Romanian Institute of Science and Technology, Cluj-Napoca, Romania

Corresponding author: Ana Moldovan (ana.moldovan@icia.ro)

Abstract

A positive association of Li consumption with the potentially protective and beneficial for the human health was reported (Barjasteh-Askari et al. 2020). Drinking water, grains, or vegetables can be a significant Li source for humans. Microdoses of Li intake may have antisuicidal, mood-stabilizing, antidepressive, and antimanic effects (Knudsen et al. 2017; Ng et al. 2019). The assessment of naturally occurring Li concentrations in water and food sources in different regions may present a high interest in the wellbeing of locals. In this study, a versatile quantitative ICP-MS method for Li quantitative determination in water and plant samples was optimized, and the relationship between Li, macroelements (Na, Mg, Al, K, Ca, Fe, Mn), and microelements (Cr, Co, Ni, Cu, Zn, Pb, Sr, Ba, V, As, Sr, Cd, Pb) concentration was assessed. Contents of Li, and micro- and macroelements were measured in groundwater (Praporgescu-GWR27, Closca-GWR28, Sipote-GWR29, and Tufani-GWR30) and plant samples (ryegrass—*Lolium* sp., nettles—*Urtica* sp., and mint—*Mentha* sp.) collected from Dobrogea karst area, Romania. The results indicated an acceptable precision in all studied matrixes and a reproducibility between 2.46 and 4.22% of the developed method. In the case of water, the highest Li concentration was measured in GWR27 followed by GWR28 (12.2 and 5.6 µg/L), while in the case of the plant's samples, *Lolium* sp. collected from GWR28 and GWR27 (11.1 and 8.8 mg/kg DW) had the highest Li concentration.

Keywords

lithium, groundwater, karst, plants, *Lolium* sp., *Urtica* sp., *Mentha* sp.

Presenting author

Anamaria Iulia Torok

Presented at

25th International Conference on Subterranean Biology (Cluj-Napoca, 18-22 July 2022)

Funding program

EEA Financial Mechanism 2014–2021

Grant title

Project GROUNDWATERISK “Monitoring and risk assessment for groundwater sources in rural communities of Romania (project number EEA-RO-NO-2018-0138 contract No. 4/2019).

Hosting institution

Emil Racovita Institute of Speleology, Cluj-Napoca, Romania

Ethics and security

None

Author contributions

Conceptualization, A.I.T., E.A.L. and O.C.; methodology, A.I.T., A.M. and C.T.; analysis, A.I.T., A.M. and C.T.; writing—original draft preparation, A.I.T., A.M. and C.T.; writing—review and editing, O.C., E.A.L. and O.T.M.; funding acquisition, O.T.M. All authors read and agreed to the published version of the manuscript

Conflicts of interest

None declared.

References

- Barjasteh-Askari F, Davoudi M, Amini H, Ghorbani M, Yaseri M, Yunesian M, Mahvi AH, Lester D (2020) Relationship between suicide mortality and lithium in drinking water: A systematic review and meta-analysis. *Journal of Affective Disorders* 264: 234-241. <https://doi.org/10.1016/j.jad.2019.12.027>

- Knudsen N, Schullehner J, Hansen B, Jørgensen L, Kristiansen S, Voutchkova D, Gerds T, Andersen P, Bihrmann K, Grønbæk M, Kessing L, Ersbøll A (2017) Lithium in drinking water and incidence of suicide: A nationwide individual-level cohort study with 22 years of follow-up. *International Journal of Environmental Research and Public Health* 14 (6). <https://doi.org/10.3390/ijerph14060627>
- Ng J, Sjöstrand M, Eyal N (2019) Adding Lithium to drinking water for suicide prevention —The ethics. *Public Health Ethics* 12 (3): 274-286. <https://doi.org/10.1093/phe/phz002>