



## Commentary: Lithium in Drinking Water and Suicide Mortality

Abdolhalim Rajabi<sup>1</sup>, Ali Shahryari<sup>2\*</sup>

<sup>1</sup> Department of Biostatistics and Epidemiology, School of Health, Golestan University of Medical Sciences, Gorgan, Iran.

<sup>2</sup> Environmental Health Research Centre, Department of Environmental Health Engineering, School of Health, Golestan University of Medical Sciences, Gorgan, Iran.

### ARTICLE INFO

#### COMMENTARY

#### Article History:

Received: 28 December 2020

Accepted: 20 February 2021

#### \*Corresponding Author:

Ali Shahryari

Email:

Dr.shahryari@goums.ac.ir

Tel:

+981732454340

**Citation:** Rajabi A, Shahryari A. *Commentary: Lithium in Drinking Water and Suicide Mortality*. J Environ Health Sustain Dev. 2021; 6(1): 1173-4.

Lithium is a drug prescribed to treat a wide range of mental disorders such as mood disorders, including depression and suicidal ideation<sup>1</sup>. Treatment levels of lithium in plasma, i.e., 0.6–1.0 mmol/L<sup>2</sup>, act through mood stabilizing effects and decreasing aggressive behaviors<sup>3</sup>. Various studies in different countries indicated that lithium therapy reduced the risk of suicide, regardless of age and gender<sup>4</sup>. Even these studies reported a 60% reduction in suicide deaths<sup>5</sup>. In humans, the rate of lithium absorption from ingested food measured at serum lithium levels (approximately 0.001 to 0.04 mEq/L)<sup>6</sup> is much lower than the recommended level for therapeutic use (approximately 0.4 to 1.0 mEq/L). Suicide, as a serious problem in modern era is a major cause of death worldwide. Based on the World Health Organization (WHO) statistics, suicide was the cause of 793,000 deaths throughout the world in 2016 with an annual global age-standardized rate of 10.5 per 100,000 population<sup>7</sup>. Suicide rates vary widely from country to country and even among regions within a country. In other words, suicide rates in the African (12.0 per 100 000), European (12.9 per 100 000), and South-East Asia (13.4 per 100 000) areas were higher than the

global average (10.5 per 100 000) in 2016. The lowest suicide rate was in the Eastern Mediterranean region (4.3 per 100 000). According to this report, the suicide rate in Iran is 4 per 100,000<sup>7</sup>. Based on the distribution of suicides in Iran, the highest suicide rate was related to Ilam province (19.53 per 100,000), while the lowest rate was related to Hormozgan province (2.2 per 100,000)<sup>8</sup>. Suicide is a complex public health problem involving mental health issues and complex causes. Many effective factors affect suicide including age, gender, and geographical, economic, family, political, and psychological states, as well as cultural, social, biological, genetic, and environmental factors<sup>9, 10</sup>. Among these factors, lithium levels in drinking water were suggested as an influencing factor on the rate of suicide in communities. Furthermore, the literature showed that lithium is inversely related to the rate of suicide. Lithium, as a natural trace element, is extracted from rocks and soil and accumulates in groundwater. Studies of these relationships in the United States and Japan showed a relationship between lithium in drinking water and suicide rates in society<sup>11, 12</sup>. However, three studies in England,

Portugal, and Italy indicated no association between lithium levels in drinking water and suicide mortality rates<sup>13-15</sup>. Drinking water can play an important role in receiving of chemical components<sup>16</sup>. Such discrepancy in the results may be associated with the complex nature of suicide. In this regard, cultural and economic factors as well as social status are among the effective factors on suicide rate. Therefore, future researchers are recommended to conduct similar studies in different communities to achieve concise and comprehensive results about the relationship between drinking water lithium and suicide rates. Hence, this study should be carried out in Iran, which has a different cultural and social context compared with other countries.

This is an Open-Access article distributed in accordance with the terms of the Creative Commons Attribution (CC BY 4.0) license, which permits others to distribute, remix, adapt, and build upon this work for commercial use.

## References

- Guzzetta F, Tondo L, Centorrino F, et al. Lithium treatment reduces suicide risk in recurrent major depressive disorder. *J Clin Psychiatry*. 2007;68(3):380-3.
- Vita A, De Peri L, Sacchetti E. Lithium in drinking water and suicide prevention: a review of the evidence. *Int Clin Psychopharmacol*. 2015;30(1):1-5.
- Machado-Vieira R, Manji HK, Zarate Jr CA. The role of lithium in the treatment of bipolar disorder: convergent evidence for neurotrophic effects as a unifying hypothesis. *Bipolar Disord*. 2009;11:92-109.
- Kessing LV, Søndergård L, Kvist K, et al. Suicide risk in patients treated with lithium. *Arch Gen Psychiatry*. 2005;62(8):860-6.
- Cipriani A, Pretty H, Hawton K, et al. Lithium in the prevention of suicidal behavior and all-cause mortality in patients with mood disorders: a systematic review of randomized trials. *American Journal of Psychiatry*. 2005;162(10):1805-19.
- Liaugaudaite V, Mickuviene N, Raskauskiene N, et al. Lithium levels in the public drinking water supply and risk of suicide: a pilot study. *J Trace Elem Med Biol*. 2017;43:197-201.
- World Health Organization. Suicide in the world: global health estimates. 2019. Available from: <https://apps.who.int/iris/handle/10665/326948>. [Cited 10 September 2020]
- Kiadaliri AA, Saadat S, Shahnavaizi H, et al. Overall, gender and social inequalities in suicide mortality in Iran, 2006–2010: a time trend province-level study. *BMJ Open*. 2014;4(8):e005227.
- Aihara H, Iki M. An ecological study of the relations between the recent high suicide rates and economic and demographic factors in Japan. *Journal of epidemiology*. 2003;13(1):56-61.
- Yoshimura R, Nakamura J, Iwata N. Effect of latitude on suicide rates in Japan. *Lancet*. 2002;360(9348):1892.
- Schrauzer GN, Shrestha KP. Lithium in drinking water and the incidences of crimes, suicides, and arrests related to drug addictions. *Biol Trace Elem Res*. 1990;25(2): 105-13.
- Ohgami H, Terao T, Shiotsuki I, et al. Lithium levels in drinking water and risk of suicide. *Br J Psychiatry*. 2009;194(5):464-5.
- Pompili M, Vichi M, Dinelli E, et al. Relationships of local lithium concentrations in drinking water to regional suicide rates in Italy. *World J Biol Psychiatry*. 2015;16(8):567-74.
- Kabacs N, Memon A, Obinwa T, et al. Lithium in drinking water and suicide rates across the East of England. *Br J Psychiatry*. 2011;198(5):406-7.
- Oliveira P, Zagalo J, Madeira N, et al. Lithium in public drinking water and suicide mortality in Portugal: initial approach. *Acta Med Port*. 2019; 32(1):47-52.
- Nikaeen M, Shahryari A, Hajiannejad M, et al. Assessment of the physicochemical quality of drinking water resources in the central part of Iran. *J Environ Health*. 2016;78(6):40-5.