

Arsenic in drinking water and suicide

It is well-known that micro or trace minerals, like arsenic, aluminium, mercury and others are essential for good health. However, in spite of the fact that our body requires a tiny amount of arsenic in order to function properly arsenic is quite toxic in higher doses. Arsenic is one of the most toxic elements with deleterious effects on different organs, including the central nervous system. Studies show positive association between arsenic exposure and several somatic disorders like diabetes mellitus, hypertension, some types of cancer, there are also findings indicating an association between arsenic exposure and elevated risk for anxiety and depressive disorders in humans and depression-like symptoms in animal experiences. A considerable part of the global population (e.g. people of some parts of Argentina, Chile, China, Hungary, India, Mexico, Taiwan and the USA) is exposed to arsenic-contaminated drinking water which is the main source of inorganic arsenic exposure in humans. The World Health Organization have set 10 µg/liter as the highest allowable limit of arsenic in drinking water,

Drinking water is contaminated with arsenic in a significant manner in several parts of Hungary. For example, at the end of the 1990s approximately 1,4 million inhabitants of the 10,3 million total population consumed water with arsenic concentrations above 10 µg/l.

Considering that some findings suggest that arsenic exposition is associated with depression and that untreated depression is the main risk factor for suicide, we hypothesized that consumption of arsenic-contaminated drinking water may be associated with elevated suicide risk as well. The suicide mortality of a given population or country is influenced by several medical-biologic, psychosocial and cultural factors including several that are alimentary/dietary in their nature.

We investigated the relationship between arsenic level in drinking water and suicide mortality in a relatively long 7-year period (between 2005 and 2011) and to avoid statistical bias we excluded settlements with a population less than 500 from our calculations. Comparing the suicide mortality (per 100.000 population/year) of 1639 Hungarian settlements with low (<10 µg/l), intermediate (11-30 µg/l), high (31-50 µg/l) and very high (>51 µg/l) levels of arsenic in drinking water we found a positive association between suicide mortality and consumption of arsenic contaminated water ; the higher was the arsenic in drinking water the higher was the suicide mortality. Considering the depression provoking effect of arsenic and the strong relationship between depression and suicide our findings are neither surprising nor unexpected. The present results also indicate that in addition to its well-known adverse health effects, high intake of arsenic may also be associated with suicidal behaviour and decreasing the arsenic content of drinking water might have suicide protective effect.

However, the facts that we have not adjusted our model for important medical and socio-demographic determinants of suicidal behavior; and we had no data on differences in bottled water consumption between settlements should be considered as limiting factors of the present study. This is the first report on the possible association between arsenic intake from drinking water and

suicidal behavior. Therefore our results need confirmations by subsequent studies. Such studies would be also able to decide whether there is a causal link or just a statistical association between high arsenic intake and suicide mortality.

Publication

[Preliminary investigation of the possible association between arsenic levels in drinking water and suicide mortality.](#)

Rihmer Z, Hal M, Kapitány B, Gonda X, Vargha M, Döme P.
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