Assessment of fluoride in drinking waters in the city of Poldasht

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ABSTRACT: One of the key ingredients that reaches through water to the body is fluoride. The increase and decrease of fluoride in drinking water can cause irreparable damages. This study aims to assess the fluoride in drinking waters in the city of Poldasht. In the study, by visiting to the health center of province, the amount of fluoride in drinking water received which has determined by using standard tests, and required analysis has been done on them. The results show that the mean amount of fluoride in water of Poldasht city is 1.77 mg per liter. And also in the surrounding villages is 2.11 milligrams per liter. The findings show that the amount of fluoride in the water of Poldasht city is higher than recommended standards by the country's industrial standard.

Keywords: water, fluoride, Poldasht

INTRODUCTION

Maintaining the public health is the primary goal of community and health authorities. To achieve this objective, a series of factors must be under the control. Water, air, food and a healthy environment, include the considered factors. Water quality has a significant impact on population health of the society. Various substances which reach into the body through drinking water have an important role in maintaining their health. Of course, a lack or excess of some of these materials can also have many effects. One of these material is fluoride(Ward et al., 2005, McDonagh et al., 2000). Fluorine is an element in the earth's crust and which exist plentiful with mineral stones such as fluor spar, cryolite and there fluorapatit(Meinert et al., 2005).

Fluoride is an element of the halogen family. A corrosive gas, green prone to yellow. The most active non-metallic ingredient that have been known, which combine with virtually all organic and inorganic elements and produce the fluorides(Yeung et al., 2013). In surface water, fluoride concentrations recorded 0.2 mg/l (0-6 mg/l), these amount in underground water is difference compared to gender of soil layers. These concentrations in groundwater in areas containing iron ore and dolomite and clay is 0.3-0.4 mg/l, in areas containing basaltic rocks less than 0.1 mg/l, in areas with alkaline rocks 7.8 mg/l and in areas with granite cliffs is 9.2 mg/l (Alrousan et al., 2009). Fluorine content in the atmosphere is very low (0.5 mg/l), so that the absorbent body is negligible compared to the total fluorine. Studies in many parts of the world have shown that high concentrations of fluoride exist in groundwater naturally. And coal have caused increasing of fluorosis – an acute bone disease - among local populations. By drinking water containing fluoride, about 50 percent enter into the tooth structure by surface receiving the remaining enter to stomach and is absorbed quickly into the bloodstream and absorb by tooth(Yousefi et al., 2013, Fard et al., 2014).

The World Health Organization suggest the appropriate amount to add fluoride to drinking water 5.0 - 1mg /l (Bhatnagar et al., 2011, Vivek Vardhan and Srimurali, 2015). Epidemiological evidence suggests that fluoride less than this value causes tooth decay. While concentrations greater than 1.7 mg /l lead fluorosis and higher concentrations of 3-6 mg /l cause bone problems(Mohan et al., 2012). So far, many studies have consisted on fluoride concentration in water that can name Tehran, Shiraz, Damghan, South Khorasan, Zanjan and Bandar Abbas, Kashan (Azami-Aghdash et al., 2013, Elham Amirhakimi and Karami, 2006, Nasehinia and Naseri, 2004).
MATERIALS AND METHODS

These study is a cross-sectional study which conducted in 2014 on drinking water sources of Poldasht city. In the study, by visiting to the health center of province, the data about conducted experiment on the city's water resources based on the methods described in the book of standard methods for the examination of water and wastewater and is expressed in milligrams per liter has received, and review and analyze the data and compare them by World Health Organization standards and Iran national standards.

In case of low level of fluoride than standard level, appropriate fluoridation methods and in case of high level of fluoride than standard level, defluoridation methods have been proposed to control the concentration of fluorine in the resources appropriately.

RESULTS

The amount of fluoride in water resources of Poldasht city in 2013 have been measured and the results are shown in Figures 1 and 2. The results show that the mean amount of fluoride in water of Poldasht city is 1.77 mg per liter.

And also in the surrounding villages is 2.11 milligrams per liter. Poldasht Water Treatment is located along the Aras River and adjacent to the border market.

The final capacity of treatment plant is 75 liters per second which supplied from the Aras River and the Balaghi Sanam fountain. Of 75 liters per seconds, 50 liters supplied from the Aras River and 25 liters of Balaghi Sanam fountain. Water fountains contains fluoride exceeded the threshold, thus combining the two sources of water to reduce fluoride and to limit water to threshold value is considered.

For this reason, we see different concentrations of fluoride in different parts of city (Figure 1). The standard criteria of the amount of fluoride in drinking water sources is Standard No. 1053 of Institute of Standards and Industrial Research of Iran about drinking water; According to the standard, the optimal level of fluoride in the water is between 0.6-1.7 mg/l. The average water fluoride in water of Poldasht city is higher than the standard values.

<table>
<thead>
<tr>
<th>The maximum amount of fluoride (mg/l)</th>
<th>Minimum average quantity of fluoride (mg/l)</th>
<th>The minimum amount of authorized fluoride(mg/l)</th>
<th>The annual average of daily maximum temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4</td>
<td>1.2</td>
<td>1.1</td>
<td>10-12</td>
</tr>
<tr>
<td>2.2</td>
<td>1.1</td>
<td>1</td>
<td>12-14.6</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0.9</td>
<td>14.6-17.7</td>
</tr>
<tr>
<td>1.8</td>
<td>0.9</td>
<td>0.8</td>
<td>17.7-21.5</td>
</tr>
<tr>
<td>1.6</td>
<td>0.8</td>
<td>0.7</td>
<td>21.5-26.3</td>
</tr>
<tr>
<td>1.4</td>
<td>0.7</td>
<td>0.6</td>
<td>26.3-32.5</td>
</tr>
</tbody>
</table>

Table 1. Fluorine variation with temperature changes according to Iran Industrial Standards Institute

![Figure 1. The amount of Fluorine in Poldasht in milligrams per liter](image-url)
The amount of fluorine in the Poldasht neighboring villages in milligrams per liter

**DISCUSSION AND CONCLUSION**

Exposure to fluoride in drinking water depends on the region's temperature and the higher the temperature, the amount of fluoride in the water should be less than the maximum recommended standards. Optimal amount of fluoride in drinking water is proposed for cities based on the average daily temperature in the warmest day of the year about 0.7 mg/l (Ayoob and Gupta, 2006, Wang et al., 2007). Pourislami and colleagues determined fluoride content of Kerman drinking water in eight major cities and concluded given that the average temperature of the city these cities, the fluoride of drinking water enamel in Kerman province is less than optimal for retrofitting of tooth (Pourislami et al., 2008).

The mean concentration of fluoride in water of Poldasht is 1.97 mg per liter and also in the surrounding villages is also 2.11. Results of a study by Youssefi et al in gonbad kavoos showed that the mean fluoride in water of this city is 0.32-0.54 milligrams per liter (Youssefi et al., 2013).

**REFERENCES**


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