Fluoride Concentration in Raw Food Items from the Villages of Sanganer Jaipur

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Abstract:
Health risks associated with fluoride are a significant environmental issue in India as well as many other parts of the world. One such state is Rajasthan, where it has been reported that almost all of the districts have high levels of fluoride in their groundwater (above the permissible level of 1.5 mg/l), and where the problem of fluorosis can be seen at various levels, including dental fluorosis, skeletal fluorosis, non-skeletal manifestations, etc. Large portions of Africa, China, the Middle East, and Southern Asia have groundwater with high fluoride levels. Quantum fluoride exposure of the population in selected fluorosis endemic areas was evaluated, taking into consideration the input of fluoride through drinking water and food.Based on an evaluation of the fluoride concentration in locally produced plant foods (cereals, pulses, vegetables, milk) from certain villages in the Sanganer Jaipur district, this study was conducted. Wheat, spinach, cabbage, cauliflower, lady finger, chana, and barley were among the raw food samples. Fluoride levels were reported to be 8.19 gm, 13.56 gm, 11.46 gm, 7.58 gm, 7.9 gm, 18.87 gm, 14.46 gm, and 4.13 gm, 4.38 gm, and 1.67 gm in buffalo milk, cow milk, and goat milk, respectively. Results indicate that wheat has the lowest fluoride concentration (7.59.0 gm), whereas spinach has the greatest fluoride content (13.56.0 gm).

Keyword: Fluoride, Milk, Wheat, fluorosis, Sanganer

Introduction:

Being the most electronegative chemical element, fluorine is rarely found in its elemental form. It ranks as the 13th most common naturally occurring element in the earth's crust and is primarily found in the chemically mixed condition known as "Fluoride." Both igneous and sedimentary rocks contain fluoride, and the amount of fluoride varies depending on where on the earth you are. Dental caries can be prevented and controlled with the use of fluoride

[Nikiforuk G.;1985]. The World Health Organization has also authorised fluoride as a method of preventing dental cavities and has suggested that it be used properly [Tomori T; et.al. 2994].Fluoride has two sharp edges. On the one hand, fluoride has positive effects such as the prevention of dental caries and aids in maintaining the integrity of oral tissues, but on the other, when used continuously and unbrokenly, fluoride has negative consequences such as dental and skeletal fluorosis [Hiremath SS.;2007].It was well known that people who lived in areas with drinking water that had 1 mg/lt of fluoride had a lower prevalence of dental cavities. Fluoride's cariostatic action was primarily systemic rather than local at the tooth's surface. Additionally, a greater fluoride concentration in drinking water has been linked to the development of dental fluorosis [Fejerskov O. et.al.;1997].Due to their crucial roles in numerous metabolic processes and their position as cofactors, trace elements are necessary and advantageous to human health in minute amounts. Overdosing on these substances is hazardous and has negative effects on the body's general metabolism. Fluoride is one of these trace elements that is widely dispersed in water, soil, and the earth. Fluorosis can result from consuming too much fluoride in food and water. More than 25 million people in 15 states of India, including Rajasthan, Tamil Nadu, Maharashtra, Bihar, Delhi, Jammu and Kashmir, Uttar Pradesh, Madhya Pradesh, Gujarat, Punjab, Haryana, Karnataka, Andhra Pradesh, Kerala, and Orissa, are at risk of developing fluorosis because potable water sources contain high levels of fluoride (2-20 ppm).Significant amounts of fluorides are also consumed by food and air pollution (Srikanta, 1977).

According to observations, food grown in fluorosis-endemic areas has abnormally high fluorine content. As a result, the affected population consumes a sizable amount of fluoride through food (Jyothi Kumari et al., 1995).So keeping all these points in mind, present study was designed to undertake following objectives. #To analyze the fluoride content in different foods grown and milk samples collected from the area of high fluoride polluted area of Sanganer Jaipur District.

Material and Methods:

Villages of Sanganer Tehsil is selected for the study having high ppm level of fluoride. Sanganer tehsil is one of the 13 tehsils that make up the Jaipur district in Rajasthan. It's a figurine found right below the tehsil of Jaipur. In both the north-south and east-west directions, the research area is roughly evenly distributed. Sanganer is bordered on the north by Jaipur tehsil, on the south by Phage tehsil, on the west by Phulera tehsil, and on

the east by Bassi and Chaksu tehsil. It is located between 26041' and 2605'N latitude and 75029' to 75054'E longitude, at a height of 431 meters. In both the north-south and east-west directions, the research area is roughly evenly distributed. Sanganer is bordered on the north by Jaipur tehsil, on the south by Phage, on the east by Bassi, and on the west by Dudu. Vegetables, cereals and fodder grown in fluoride endemic villages and irrigated with groundwater containing high fluoride were collected in polyethylene containers and brought to laboratory. Similarly, milk samples of goat, cow and buffalo were taken from fluorosis endemic villages. Fluoride content in the sample of food items and milk samples were estimated by Potentiometric method [JAOAC,1975].

Result and discussion:

Fluoride can also be found in crops cultivated in endemic areas. The fluoride content in crops, vegetables, and milk samples was the subject of a thorough investigation in the research region. Chronic fluoride ingestion controls the start of fluorosis and the severity of symptoms, with the most critical factors being the amount of fluoride consumed and the length of exposure (Viswanadham and Murty, 1977). Crops, vegetables, and milk samples were obtained from villages with high fluoride levels. Fluoride uptake and build up tests on them were also carried out in the lab.

Leafy vegetables like onion and mustard leaves were found to have high fluoride content. Highest fluoride concentration was recorded in onion leaves (**µg/g** of sampling area; irrigated with groundwater having mg/L fluoride concentration (Table 6). In other vegetables also like chilli, potato, spinach and cabbage, Fluoride content was estimated. High content was also recorded in Spinach 13.56**µg/g**from sampling location irrigated with water having mg/L fluoride. Wheat and Chana were tested for fluoride concentration in grains. Even when irrigated with high fluoride water, fluoride content was lower in cereals, with the maximum concentration found in Chana 18.87 (**µg/g**/g) samples obtained from a sampling location and irrigated with water containing mg/L fluoride concentration.

Cow, buffalo, and goat milk were gathered from villages with high fluoride levels in their water supplies. Fluoride levels in milk were low in all of the samples. The maximum concentration was found in cow's milk (8.25**µg/g**/ml), while the lowest concentration was found in goat's milk. (8.25 **µg**/ml) of (Table 7).

According to the findings, fluoride content in food varies depending on fluoride levels in irrigation water and soil. It also depended on the plant's fluoride tolerance and ability for accumulation. The main source of increased fluoride exposure to the population is through diet during the winter months. This is owing to people's increased reliance on groundwater for crop and vegetable irrigation due to a lack of adequate rainfall.

Table 6 : Fluoride Concentration in Raw Food Items in The Study Area

S. No.	Name of sampling site	No. of Samples analyzed	Raw Food stuffs	Fluoride Content (µg/g) in Food
1.	.....	12	Wheat	8.19
			Spinach	13.56
			Cabbage	11.46
			Cauliflower	7.58
2.	.....	12	Wheat	7.59
			Ladyfinger	7.90
			Chana	18.87
			Barley	14.56

Table 7 : Fluoride Concentration in Milk Samples in The Study Are

S. No.	Name of Sampling Site	No. of Samples Studied	Fluoride in Buffalo Milk(µg/ml)	Fluoride in Cow Milk (µg/ml)	Fluoride in Goat Milk (µg/ml)
1.	....	5	4.13	4.38	1.67
2.	.....	5	3.45	4.12	5.36

Conclusion:

The current study aims to understand the effects of high water fluoride levels on the fluoride content of unprocessed agricultural products and milk. The highest levels of fluoride were detected in milk and vegetables among grains. Consequently, the following findings from the current study are possible: People could be informed about which foods should be consumed in less quantities by using the fluoride values of local foods. For example, since pulses absorb more fluoride than vegetables and cereals, consumption of pulses should be limited. A large-scale filtering system that can remove excessive fluoride from the water in locations where fluorosis is a problem is needed, according to a study.

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References:

1. Nikiforuk G. Understanding Dental Caries – Prevention, Basic and ClinicalAspects. Karger Publishers. 1st ed. 1985. Pp. 113–14.
2. Tomori T, Koga H, MakiBY and Takaesu Y. Fluoride analysis of foods for infantsand estimation of daily fluoride intake. Bull Tokyo dent Coll. 2004;45(1):19-32.
3. Hiremath SS. Textbook of Preventive and Community Dentistry. Fluorides. 1st Ed Elsevier Publishers – 2007. Pp. 370.
4. Fejerskov O, Ekstrand J and Brain A. Burt. Fluorides in Dentistry. 2nd Edition. Munksgaard Publishers. 1996. Pp. 40–49.
5. Srikantia S.G.(1974) :Permissible level of fluoride in drinking water. Proceeding of the symposium on fluorosis , Hyderabad, India
6. JAOAC,1975.Journal of Associates of Analytical Chemists, 58: 1129.