

FLUORIDE CONTENT IN DRINKING WATER OF VARIOUS BLOCKS OF RAJASTHAN AND ITS ASPECT OF SEASONAL AND TEMPORAL FLUCTUATION

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Abstract

Fluoride ion in excess is known for its adverse physiological effects on human body. Major source of fluoride intake into the body is drinking water laden with this ion. Though, the problem of fluoride excess is a worldwide phenomenon, but India and particularly Rajasthan state is the hotspot of this menace. Many surveys and research works have been conducted by researchers, government organizations and NGO in this state pertaining to fluoride endemicity. District-wise profile of endemic fluoride based on such reports is being presented in this paper. Our data of the fluoride content survey in some pockets of Jodhpur & Bikaner division exhibits some seasonal and temporal fluctuations that is why the surveys conducted by different people register different fluoride ion content in water from the same place, but rock aquifers does keep the fluoride concentration in a characteristic range in identified zones.

Key words

Fluoride, drinking water, seasonal, temporal, fluctuation

1. Introduction

Fluoride a form of Fluoride is described as essential element for human body, but if the intake is in excess quantity, it is hazardous and a matter of serious health concern. Major signs of the fluoride toxicity is exhibited in the form of its effects on dentine and enamels and known as dental fluorosis. In fluoride endemic area this symptom is very common to observe. Another manifestation appears in the form of skeletal fluorosis and crippling deformities. But, excess fluoride intake into the body is also known to cause adverse effects on renal, reproductive, gastrointestinal, endocrine, cardiovascular system etc. premature ageing along with neurological and immunological problems have also been reported (Hussain et. al. 2004). Though, foodstuff, medicament, cosmetics and air may also facilitate the entry of fluoride into the body but main route of fluoride intake is its excess in the drinking water.

The problem of fluorosis is worldwide phenomenon. Many countries across all the continents are affected and in India populations of almost 17 states are suffering from the problem of fluoride excess and fluorosis (RGNDWM, 1993). Rajasthan is among the state prominently stricken from the endemic fluorosis. Out of around 33211 fluoride affected villages in India, more than 51 percent of fluoride affected villages in India, and nearly 10 percent of fluoride affected habitation in world is in Rajasthan alone (Singh et al. 2011). Fluorides in drinking water of Rajasthan have been found to originate from igneous rocks, which extend from Delhi to Gujarat. The geological distribution of rocks in Rajasthan reveals that fluorotic ores occupy large areas of eastern and southeast part of this state (Shiv Chandra 1983). Arid and semi-arid climate and lesser rainfall makes this state more dependent on

ground water for exploitation of aquifers, that further aggravates the problem. In this paper the works and reports related to fluoride of drinking water in various districts and sample results of our study on seasonal and temporal fluctuation in fluoride content has been described.

2. Fluoride Content in available Drinking water in districts of Rajasthan

These are numerous reports of fluoride content in drinking as per the surveys conducted in various districts of Rajasthan.



Map 1:- District wise geopolitical map of Rajasthan, India.

S. No.	District	F-content in groundwater(ppm)
1.	Ajmer	0.1-16.9
2.	Alwar	1.5-9.9
3.	Banswara	1.2-4.6
4.	Baran	0.2-1.2
5.	Barmer	0-10+
6.	Bharatpur	1.5-4.9
7.	Bhilwara	0.4-13.0
8.	Bikaner	1.5-9.9

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9.	Bundi	0.0-5.0
10.	Chittorgarh	0.0-6.0
11.	Churu	0.0-6.5
12.	Dausa	1.5-9.9
13.	Dholpur	1.5 - 4.9
14.	Dungarpur	0.1-10
15.	Hanumangarh	1.01-4.78
16.	Jaipur	4.5-28.1
17.	Jaisalmer	3.0-10+
18.	Jalore	1.5-12
19.	Jhalawar	0.1-1.2
20.	Jhunjhunu	0.6-8.8
21.	Jodhpur	0.4-6.5
22.	Karauli	0.5-4.5
23.	Kota	1.2-4.8
24.	Nagaur	0.6-44
25.	Pali	0.5-14.5
26.	Rajsamand	0.0-4.5
27.	Sawai Madhopur	1.5-10.5
28.	Sikar	1.5-15
29.	Sirohi	1.5-16
30.	Sri Ganganagar	0.5-5.4
31.	Tonk	0.5-11.8
32.	Udaipur	0.1-11.7
33.	Pratapgarh	0.2-4.7

Table no. 1: Fluoride content in drinking water source in different districts of Rajasthan

It is apparent that while the WHO standard and BIS: 10500-19912 permit only 1.5 mg/l as a safe limit of fluoride in drinking water for human consumption. People in several districts in Rajasthan are consuming water with fluoride concentrations of up to 24 mg/l.

3. Seasonal and temporal fluctuation in fluoride of groundwater

In Pali district we conducted a survey of fluoride content in drinking ground waters in various villages of selected pockets; we conducted the survey twice in the year at same spots. First it was in the month of January-February and second time during the rainy season in the month of July-August. This was to analyse the seasonal variation in fluoride content of ground water. Water samples were collected at 47 villages from various tehsils of Pali. In table 2 the sample data of our study is being provided to indicate the time based and seasonal variation in fluoride content of the groundwater.



Map 2 : Block wise geopolitical map of Pali District ,Rajasthan

Sr.No	Blocks	F content in ppm	
		July-August	Jan -Feb
1	Rohat	1.30-1.50	1.45-2.30
2	Desuri	1.15-1.40	1.50-3.20
3	Nadol	1.62-3.80	1.6-4.5

4	Raipur	1.80-3.90	1.8-4.7
5	Bali	1.60-2.08	1.5-2.7
6	Falna	0.8-3.30	0.7-3.65
7	Jaitaran	0.6-4.70	0.6-4.80
8	Sumerpur	0.9-3.10	0.7-3.69
9	Sojat	1.2-3.20	0.8-3.98
10	Marwar Junction	1.5-3.80	1.2-4.20

Table no. 2 Fluoride content of hand pump water in some villages of Pali

4. Conclusion

In this paper the threat of fluoride toxicity across the entire state and policy makers to set the district wise preference of mitigation measures. The main threat area in the drinking water profile in Rajasthan state is known since long. But, no one had studied the fluctuation pattern in the fluoride content before. Through our study we reported Seasonal and temporal fluctuation in the drinking water profile in Pali district, it was not only recorded, rather the underlying cause was also tried to be identified. Variable pattern of geological rock formation in different pockets of the district is mainly regulating such changes, and the magnitude of fluctuation is augmented by erratic rainfall pattern and eco-climatic changes. Therefore information may be useful for agencies working on the drinking water problems and expected ramification of the same.

5. References

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