



FLUORIDE CONTAMINATION IN WATER OF KOSHI REGION (BIHAR)

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ABSTRACT

Water is a prime natural resource, a basic human need and a precious national asset. Natural water always contains dissolved and suspended substances of organic and mineral origin. Water is polluted with metabolites of aquatic plants and animals and the products of their decay. All these cause so many water borne diseases. The excessive amount of fluoride in water and environment is harmful. The quality and availability of water depend on the way, We use and misuse this precious resource, which is the most important life supporting substance.

The present study has been undertaken for the determination of fluoride in drinking water collected at random from Koshi region. The fluoride concentration values vary from 0.6 mg/L to 1.6 mg/L. In the affected areas, it was found that citizens are suffering with different types of fluorosis. Authors have suggested the people to use generally alum and lime to avoid all types of fluorosis.

Key words : Fluoride, Contamination, Water quality, Koshi

INTRODUCTION

In Bihar, ground water is the most important source of drinking and irrigation water. The purpose of this interdisciplinary study, undertaken along the levee of river Koshi was to determine the existence and intensity of fluoride contamination in aquifers being tapped for direct and indirect ingestion of the properties of the region's ground water, in the eight districts of Bihar (India), i. e. Saharsa, Mahepura, Supaul, Purenea, Katihar, Araria, Kishanganj and Khagariya.

Fluorides are soluble in water. These are quite widely spread in nature in Earth crust as well as below it. Consequently, these become available in ground water, found in

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many parts of India as well as the World. Other sources of fluorides are tea, rock-salt and food grains like sorghum, Ragi, Bajra etc. in addition to certain industrial discharges like those from aluminum extraction industry¹.

Fluorides lead to various types of physiological effects on human beings and animals, when these are present in drinking water². It is a specific parameter, which has adverse effects, when present in drinking water below as well as above the permissible limits³. About 96 percentage of the fluoride in the body is found in bones and teeth. Fluoride is also essential for the normal mineralization of the bones and formation of dental enamel.

A permissible limit of fluoride concentration in drinking water as per WHO guideline is up to 1.5 mg/L⁴. If it is present in a concentration 1.5 to 3 mg/L, it causes dental fluorosis. If its concentration is 3.1 to 6 mg/L, it develops the problem, which is clinically known as skeletal fluorosis. If it is present in excess of 6 mg/L, the crippling skeletal fluorosis problem is developed. In addition to the dental and orthopedic problems mentioned above, fluorides also lead to development of double-headed sperms, deformations in bone-structures, reduction in Intelligence Quotient (I.Q.) and certain types of cancerous situations like osteosarcoma.

EXPERIMENTAL

Tube well's water samples were collected from different block of Saharsa, Bihar. Samples were collected in sterilized glass bottles. The concentration of fluoride was determined with the help of a field testing kit (FTK). The standard permissible value of fluoride according to APHA⁵, BIS, WHO and Ministry of Urban Development are given below.

Table 1 : Limits of fluoride concentration (mg/L)

	Min. acceptable conc.	Max. allowable conc.
International standards	0.7	1.5
Indian standards (I. S. 10500/1983)	0.6	1.0
WHO (2004)	1.0	1.5
Ministry of Urban Development	1.0	1.5

RESULTS AND DISCUSSION

The results of different samples taken from about 20 places of Saharsa, Koshi region are given in Table 2.

Table 2

Sample station	Block	Fluoride (mg/L)
Sri. P. N. Singh, Navaratnapur, Sardhia	Simri Bakhtiyarpur	0.87
Navaratna Pustkalaya, Navaratnapur Sardhia	-do-	0.94
West Tola, Sardhia	-do-	1.09
Late R. N. Singh, West Tola, Sardhia	-do-	1.02
D. D. High School, Sardhia	-do-	0.87
Thakur Bari, Sardhia	-do-	1.40
Primary School, Jhitki	Mahisi	1.00
Block H. Q. Sour Bazar	Saur Bazar	1.20
Primary School, Sahpur	Sattar Kateya	1.5
Middle School, Murli Basantpur	-do-	0.9
Middle School, Jarsain	-do-	0.9
Harijan Primary School, Gobargadha	-do-	0.8
Md. Sah Nawaj, Kash Nagar	Sonbarsa	0.7
Sri Anup Mukhiya, Kashimpur	Salkhua	1.5
J. Navodya Vidyalaya, Bariyahi	Kahara	0.6
Saharsa Basti	Nagar Parisad	0.9

Cont...

Sample station	Block	Fluoride (mg/L)
Sant Nagar	-do-	0.6
Bus Stand	-do-	0.8
Koshi Project	-d-	0.8
Naya Bazar	-do-	0.9

The concentration of fluoride in all samples fall within permissible limits of WHO-2004 i. e. 1.5 mg/L. These water samples have lower than 1.0 ppm fluoride, which is a safe limit for drinking as well as irrigation purpose suggesting lower hazard of fluorosis⁵.

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