

Study Of Fluoride Level In The Water Of Bore-Wells Of Nizamabad Nagar Panchayat Of Azamgarh District

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ABSTRACT- *The disproportionate quantity of fluoride presents in ground water as well as in drinking water causes dental fluorosis, mottling of teeth, osteoporosis etc. Ground water contains fluoride ions dissolved from geographical formations. The presence of low concentrations or absence of fluoride in water results in an elevated prevalence of dental caries in children's teeth. Therefore the concentration of fluoride should be within acceptable limit as prescribed by various organizations such as WHO, ICMR and BIS.*

Hence, it becomes very important to study the fluoride concentration in the ground water of bore-wells used for drinking purpose. In the present study, fluoride content has assessed by standard analytical procedures and found in the range 0.021 to 0.614 ppm at different sampling stations of Nizamabad Nagar Panchayat during Jan 2014 to Nov 2014.

Key words- *Fluorosis, dental caries, mottling, osteoporosis, borewells.*

INTRODUCTION- Water is most significant component of our environmental system. All the living creatures depend upon water in one way or the other. A perusal of history revealed that there are instances that civilizations have vanished due to scarcity of water or due to water born diseases. Today water has become indispensable commodity for the development of industries and agriculture.

The general surveys reveals that total surface area of earth is about 51.00 crore sq kilometers out of which 36.01 crore sq kilometers is covered by sea. Addition to this, we get water from rivers, lakes, tanks and snow in hills. About 15.00 crore cubic kilometers of water is also found on the average layers of the earth. Although it is surprising but true that in spite of such abundance there is very little soft water in the world, which become very precious and scare, mainly due to the increase in human population and fast development. The insufficient and unbalanced water supply through piped water system has forced the population to use whatever quality of water available in nearby water sources; this often leads to water borne diseases and other serious health hazards. It is therefore essential to examine the quantity as well as quality of water supply.

The disproportionate quantity of fluoride presents in ground water as well as in drinking water causes dental fluorosis, mottling of teeth, osteoporosis etc. Ground water contains fluoride ions dissolved from geographical formations. The presence of low concentrations or absence of fluoride in water results in an elevated prevalence of dental caries in children’s teeth. Therefore the concentration of fluoride should be within acceptable limit as prescribed by various organizations such as WHO (World Health Organization), ICMR (Indian Council of Medical Research) and BIS (Bureau of Indian Standards).

Specially, the fluoride content in the water above permissible limit causes dental fluorosis, skeletal fluorosis [1, 2], osteoporosis and other serious teeth disorders [3, 4, 5]. The optimum fluoride concentration in water protects teeth from decay without causing remarkable fluorosis. Fluoride ingested with water is almost completely absorbed and distributed rapidly throughout the body, with main retention in the bones and a small portion in the teeth. The aquifers which are deeper contains high fluoride up to 1.33 ppm [6, 7] while the value of 0.5 to 1.0 ppm has recommended by WHO [8].

MATERIALS AND METHODS- This study aims to assess the fluoride content in drinking water samples collected from various sampling stations of Nizamabad Nagar Panchayat of Uttar Pradesh during Jan 2014 to Nov 2014. Nizamabad town is an important town of Azamgarh district famous for black pottery and located at 26.05⁰N 83.06⁰E coordinates with the average elevation of 72 meters. The Nizamabad Nagar Panchayat has eleven wards, the details of which are given in the table-1

TABLE-1
DETAILS OF SAMPLING STATIONS

S.No.	WARD	SAMPLING STATION	OWNER OF THE BORE-WELL
1.	NIZAMABAD WARD No. 1	SS ¹	Mr. Hariom Singh
2.	NIZAMABAD WARD No. 2	SS ²	Mr. Gyan Prakash Singh
3.	NIZAMABAD WARD No. 3	SS ³	Mr. Ashok Kumar Srivastava
4.	NIZAMABAD WARD No. 4	SS ⁴	Mr. Shailesh Kumar Yadav
5.	NIZAMABAD WARD No. 5	SS ⁵	Mr. Abdul Baqi
6.	NIZAMABAD WARD No. 6	SS ⁶	Mr. Pushpa Kumar Singh
7.	NIZAMABAD WARD No. 7	SS ⁷	Mr. Ashok Kumar Agrawal
8.	NIZAMABAD WARD No. 8	SS ⁸	Mr. Kanahiya Lal Gupta
9.	NIZAMABAD WARD No. 9	SS ⁹	Mr. Hifzurrahman
10.	NIZAMABAD WARD No. 10	SS ¹⁰	Mr. Sanjay Singh
11.	NIZAMABAD WARD No. 11	SS ¹¹	Mr. Mohd Kaleem Ansari

Water samples of bore-wells were collected from above mentioned sampling stations of Nizamabad Nagar Panchayat by using standard sampling procedure. The samples were collected during Jan 2014, Mar 2014, May 2014, July 2014, Sep 2014 and Nov 2014 simultaneously analyzed for their fluoride content.

In the acidic medium Zirconium reacts with Alizarin Red-S to form violet complex, which is bleached on the addition of fluoride ion and colour changes from red violet to yellow green [9]. 100 ml of filtered sample is taken and Sodium Arsenite solution is added to the filtered sample, then 5 ml of Zirconyl acid solution was added to it for the removal of SO_4^{-2} interference, followed by the addition of Alizarin Red – S now, wait for at least one hour. Measure the intensity of light at 570 nm and calculate the concentration with the help of standard curve. The above mentioned analytical procedure is followed as prescribed by APHA [10,11].

RESULTS AND DISCUSSIONS- The results of analysis of fluoride content in the water samples of bore wells of Nizamabad Nagar Panchayat are summarized in Table-2.

TABLE-2
FLUORIDE CONCENTRATIONS* OF DIFFERENT BORE WELLS

SAMPLING STATION	JAN'2014	MAR'2014	MAY'2014	JUL'2014	SEP'2014	NOV'2014
SS ¹	0.231	0.233	0.239	0.262	0.299	0.313
SS ²	0.263	0.265	0.268	0.299	0.315	0.343
SS ³	0.349	0.358	0.368	0.383	0.409	0.441
SS ⁴	0.021	0.025	0.029	0.037	0.051	0.063
SS ⁵	0.454	0.462	0.473	0.493	0.509	0.524
SS ⁶	0.061	0.063	0.083	0.089	0.098	0.103
SS ⁷	0.209	0.211	0.219	0.243	0.272	0.291
SS ⁸	0.411	0.416	0.423	0.441	0.469	0.497
SS ⁹	0.549	0.552	0.563	0.571	0.593	0.614
SS ¹⁰	0.066	0.069	0.078	0.084	0.099	0.112
SS ¹¹	0.083	0.094	0.097	0.103	0.108	0.117
MINIMUM VALUE	0.021	0.025	0.029	0.037	0.051	0.063
MAXIMUM VALUE	0.549	0.552	0.563	0.571	0.593	0.614

*Fluoride concentration in ppm

The analysis report revealed that, the fluoride content in water samples taken from the bore wells ranges from 0.021 to 0.614 ppm at different sampling stations. Fluoride in water results in a

substantial reduction in dental caries in children and adults. It is always been desirable in water if the limit is below 0.6 ppm. In the case if the limit is more than the threshold limits the water source cannot be discarded as such but some health measures should be taken to correct the water of that source.

In the present study fluoride concentration is found within the prescribed limit except for two samples at one sampling station (SS⁹) which were slightly more than the maximum threshold level. Apart from rock forming minerals which on weathering can contribute to the fluoride content in ground water, the use of phosphoric fertilizers in agriculture and industrial effluents can enhanced the fluoride concentration of ground water [12]. Fluoridation may be suggested in case of low fluoride concentration of ground water [13].

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