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RESEARCH ARTICLE

ANALYSIS OF FLUORIDE CONCENTRATION IN THE WATER OF BORE-WELLS OF SARAIMEER NAGAR PANCHAYAT OF AZAMGARH DISTRICT

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ABSTRACT

Fluoride at optimal level decreases the incidence of dental caries and is also necessary for maintaining the integrity of oral tissues but at the same time when taken in excess during development stages can cause adverse effects like dental fluorosis, skeletal fluorosis , mottling of teeth, osteoporosis etc. Ground water contains fluoride ions dissolved from geological formations. Therefore, the concentration of fluoride should be within permissible limit as prescribed by various organizations such as WHO, ICMR and BIS.

Hence, it becomes very important to analyze the fluoride in the 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 0.023 to 0.604 ppm at different sampling stations of Saraimeer Nagar Panchayat during Jan 2014 to Nov 2014.

INTRODUCTION

Water is an integral part of our environment, all the living organisms depend upon water in one way or the other but there are instances that civilizations have disappeared due to shortage of water or due to water born diseases. Today water has become essential 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 makes it very precious and scarce, mainly due to the increase in human population and fast development. The inadequate and irregular 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 monitor the water supply as well as quality of water.

Specially, fluoride at optimal level decreases the incidence of dental caries and is also necessary for maintaining the integrity of oral tissues but at the same time when taken in excess during development stages can cause adverse effects like dental fluorosis, skeletal fluorosis [1,2], mottling of teeth, osteoporosis etc. Ground water contains fluoride ions dissolved from geological formations. Therefore the concentration of fluoride should be within permissible limit as prescribed by various organizations such as WHO, ICMR and BIS. Fluoride ingested with water is almost completely absorbed and distributed rapidly throughout the human body, with retention mainly in the bones and a small portion in the teeth. The aquifers which are deeper contains high fluoride up to 1.33 ppm [3, 4] while the value of 0.5 to 1.0 ppm has recommended by WHO [5].

MATERIALS AND METHODS

In this study attempts were made to assess the fluoride content in drinking water samples collected from various sampling stations of Saraimeer Nagar Panchayat of Uttar Pradesh during Jan 2014 to Nov 2014. Saraimeer is an important town of Azamgarh city and located at 26°01′N 82°55′E coordinates. The nagar panchayat has thirteen wards, one sampling stations has selected from each ward, the details of which are given in the table-1

Water samples of bore-wells were collected from above mentioned sampling stations of Saraimeer Nagar Panchayat by using standard sampling procedure. The samples were collected during Jan 2014, Mar 2014, May 2014, July 2014, Sep 2014

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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 [6]. 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, waited for at least one hour and then measured the intensity of light at 570 nm and calculated the concentration with the help of standard curve. This analytical procedure is in accordance with the standard method described by APHA [7, 8 & 9].

Table 1 Details of Sampling Stations

S.No.	WARD	SAMPLING STATION	OWNER OF THE BORE-WELL
1.	SARAIMEER WARD No. 1	SS^1	Mr. Abdur Rahman
2.	SARAIMEER WARD No. 2	SS^2	Mr. Haqeemuddin
3.	SARAIMEER WARD No. 3	SS^3	Mr. Mohd Ali
4.	SARAIMEER WARD No. 4	SS^4	Mr. S.K. Gupta
5.	SARAIMEER WARD No. 5	SS^5	Mr. L. M. Singh
6.	SARAIMEER WARD No. 6	SS^6	Mr. Abid Ali
7.	SARAIMEER WARD No. 7	SS^7	Mr. Mohd Qaiyum
8.	SARAIMEER WARD No. 8	SS^8	Mr. S.S. Mishra
9.	SARAIMEER WARD No. 9	SS^9	Mr. Saleem Ahmad
10.	SARAIMEER WARD No. 10	SS^{10}	Mr. Mushtaque Ahmad
11.	SARAIMEER WARD No. 11	SS^{11}	Mr. Mohd Yaqub
12.	SARAIMEER WARD No. 12	SS^{12}	Mr. S. K. Yadav
13.	SARAIMEER WARD No. 13	SS^{13}	Mr. A.R. Azmi

Table 2 Fluoride Concentrations* of Different Bore Wells

SAMPLING STATION	JAN' 2015	MAR' 2015	MAY' 2015	JUL' 2015	SEP' 2015	NOV' 2015
SS^1	0.265	0.271	0.281	0.289	0.293	0.311
SS^2	0.265	0.273	0.279	0.284	0.292	0.312
SS^3	0.462	0.474	0.485	0.496	0.502	0.511
SS^4	0.063	0.072	0.079	0.082	0.089	0.093
SS^5	0.211	0.223	0.234	0.241	0.252	0.261
SS^6	0.552	0.563	0.572	0. 589	0.593	0.604
SS^7	0.069	0.075	0.084	0.093	0.099	0.112
SS^8	0.416	0.427	0.439	0.441	0.449	0.457
SS^9	0.349	0.358	0.364	0.373	0.385	0.399
SS^{10}	0.023	0.027	0.032	0.041	0.049	0.052
SS^{11}	0.233	0.243	0.249	0.255	0.264	0.269
SS^{12}	0.262	0.269	0.276	0.281	0.286	0.293
SS^{13}	0.299	0.309	0.311	0.314	0.322	0.334
MINIMUM VALUE	0.023	0.027	0.032	0.041	0.049	0.052
MAXIMUM VALUE	0.552	0.563	0.572	0. 589	0.593	0.604

*Fluoride concentration in ppm

RESULTS AND DISCUSSIONS

The results of analysis of fluoride content in the water samples of bore wells of Saraimeer Nagar Panchayat are summarized in Table-2. The analysis report revealed that, the fluoride content in water samples taken from the bore wells ranges from 0.023 to 0.604 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 one samples at one sampling station (SS^6) 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 [9]. Fluoridation may be suggested in case of low fluoride concentration of ground water [10].

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