

Research Article

STUDY OF FLUORIDE CONTENTS IN THE WATER OF BORE-WELLS OF JAUNPUR CITY

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ABSTRACT

The presence of excessive amount of fluoride in bore wells and drinking water causes dental fluorosis, mottling of teeth etc. Ground water contains fluoride ions dissolved from geological formations. The presence of low concentrations or absence of fluoride in water results in a high incidence of dental caries in children's teeth. Therefore the concentration of fluoride should be within permissible limit as prescribed by various organizations such as ICMR, WHO, BIS etc.

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 0.021 to 0.629 ppm at different sampling stations of Jaunpur City during Jan 2012 to July 2012.

Key Words: *Fluorosis, Dental Caries*

INTRODUCTION

Water is an important part of our environment. All the living creatures 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 become very precious and scare, 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, the fluoride content in the water above permissible limit causes dental fluorosis, skeletal fluorosis and other serious teeth disorders. The optimum fluoride concentration in waster 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 (Kataria, 2006 and Handa, 1988) while the value of 0.5 to 1.0 ppm has recommended by WHO (1971).

MATERIALS AND METHODS

In this study attempts were made to assess the fluoride content in drinking water samples collected from various sampling stations of Jaunpur City of Uttar Pradesh during Jan 2012 to July 2012. The details of which are given in the table-1.

Water samples of bore-wells were collected from above mentioned sampling stations of Jaunpur City by using standard sampling procedure. The samples were collected during Jan 2012, March 2012, May 2012 and July 2012 and simultaneously analyzed for their fluoride content.

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Table 1: Details of Sampling Stations

S.No.	LOCALITY	SAMPLING STATION	OWNER OF THE BORE-WELL
1.	MIYANPUR	SS ¹	Dr. S. SRIVASATVA
2.	SIPAAH	SS ²	Mr. H. P. SINGH
3.	POLYTECHNIQUE CROSSING	SS ³	Mr. P. N. YADAV
4.	NOOR KA QUYAN	SS ⁴	Mr. A. KHAN
5.	KHARKA	SS ⁵	Mr. S. TIWARI
6.	OLANDGANJ	SS ⁶	Mr. P. K. SINGH
7.	SHAHI PUL	SS ⁷	Mr. B. R. LAL
8.	PADAAO	SS ⁸	Mr. R. A. SETH
9.	VIRANDAVAN	SS ⁹	Mr. D. R. YADAV
10.	GURU BAGH (RAS MANDAL)	SS ¹⁰	Mr. S. J. YADAV

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 (Megregian,1954). 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 and Manivaskam (1993 and1996).

RESULTS AND DISCUSSIONS

The results of analysis of fluoride content in the water samples of bore wells of Jaunpur City are summarized in Table-2.

The analysis report revealed that, the fluoride content in water samples taken from the bore wells ranges from 0.021 to 0.629 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.

Table 2: Fluoride Concentrations* of Different Bore Wells

SAMPLING STATION	JANUARY'2012	MARCH'2012	MAY'2012	JULY'2012
SS ¹	0.264	0.298	0.314	0.341
SS ²	0.182	0.201	0.239	0.265
SS ³	0.021	0.034	0.047	0.053
SS ⁴	0.352	0.389	0.410	0.439
SS ⁵	0.048	0.064	0.084	0.108
SS ⁶	0.482	0.511	0.532	0.578
SS ⁷	0.201	0.221	0.251	0.271
SS ⁸	0.561	0.583	0.604	0.629
SS ⁹	0.062	0.078	0.092	0.103
SS ¹⁰	0.413	0.438	0.457	0.484
MINIMUM VALUE	0.021	0.034	0.047	0.053
MAXIMUM VALUE	0.561	0.583	0.604	0.629

*Fluoride concentration in ppm

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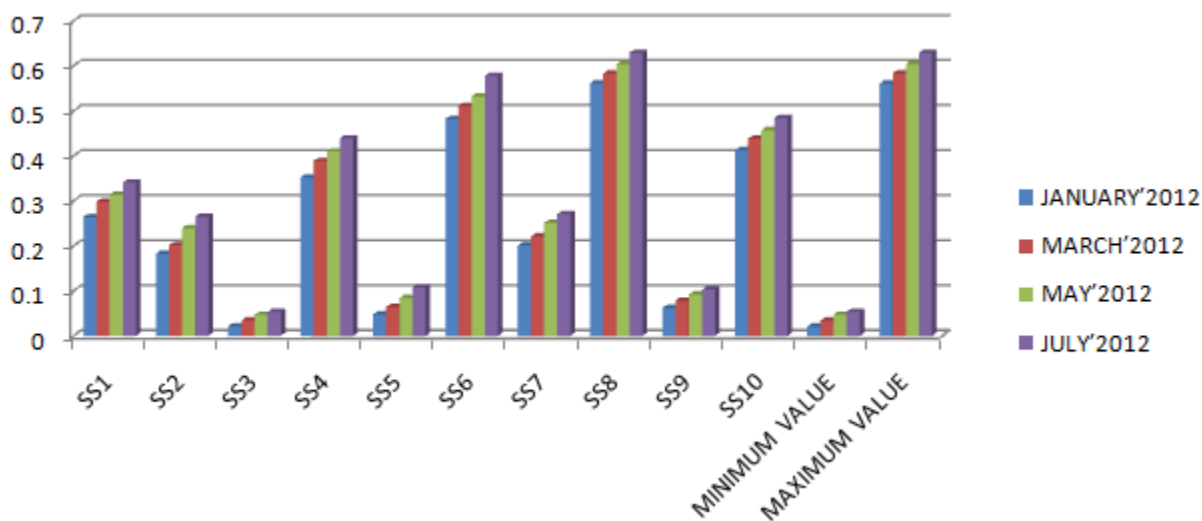


Figure 1: Concentration of Fluoride at Different Sampling Sites

In the present study fluoride concentration is found within the prescribed limit except for two samples at one sampling station (SS⁸) 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 (Handa, 1975). Fluoridation may be suggested in case of low fluoride concentration of ground water (Khadsan, 2007).

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