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Groundwater quality with special reference to fluorosis of Jehur-mungsapur Region, Tehsil Kannad, District Aurangabad, (MS) India

Pravin Chavan[1], Jagdish Thakur[1] and Sachin Bangale[2]

[1]*Department of Chemistry, M.T.E.S. Doshi Vakil Arts & G.C.U.B. Science & Commerce College, Goregaon- Raigad (M.S.) India*
[2]*Department of Chemistry, Gopinath Mahadev Vedak College of Science Tala, Raigad (M.S.) India*

ABSTRACT

Aurangabad district of Maharashtra is famous for cotton production. Major area of the district is covered by large number of small and big cotton Production of land. Cotton land use huge amount of fertilizers and pesticides, which are potential, sources of fluoride. In this study, monitored the fluoride level and some other parameters of groundwater of a large area occupied by different types of small and big cotton land of Aurangabad revenue circle. Fluoride level in the groundwater of cotton land area is found slightly greater than other area.

Keywords: Water quality, Groundwater, fluoride, cotton land, etc.

INTRODUCTION

In Aurangabad, from thirty years the percentage of cotton land is increases, incidence of fluorosis has been raising in recent years alongside the mindless extraction of groundwater [1, 2]. Lack of rainfall has meant that the district is largely depends on groundwater, both for irrigation and drinking water requirements. Incessant digging of bore wells has given rise to sharp rise in the fluoride concentration in the ground water. Fluoride and other dissolved salts in drinking water have exceeded the safe limit in the past two decades. A high intake of fluoride (> 1.5mg/l) in drinking water over the prolonged period is known to cause damage to the enamel of the teeth, and eventually result in skeletal complications leading to fluorosis [3]. WHO (2006) [4] has considered fluoride as one of the very few chemicals that have been shown to cause significant effects in people. There is a narrow margin between the desired and harmful doses of fluoride [5]. Low concentration of fluoride in drinking water have been considered beneficial to prevent dental carries [3], but excessive exposure to fluoride can give rise to a number of adverse effects such as causing fluorosis. WHO has set a limit value of 1.5 mg·L−1 for fluoride in drinking water [6]. This necessitates an accurate, simple, rapid and cost effective analytical method is of high importance.

Water is an essential natural resource for sustaining life and environment that we have always thought to be available in abundance and free gift of nature however chemical composition of surface or subsurface water is one of the prime factors on which the suitability of water for domestic, industrial and agriculture purpose depends. Fresh water occurs as surface water and ground water in this groundwater contributes only 0.6% of the total water resources on earth. It is major and preferred source of drinking water in rural and urban areas particularly in India. Water content many minerals like calcium, magnesium and fluoride etc. in this fluoride essential in minute quantity for normal mineralization of bone & teeth (for formation of dental enamel) [7] fluoride stimulate growth of many plant species [8] but on other hand when fluoride is taken up in excessive amount may prove toxic to plant and on feeding may toxic to animal & human as fluorosis. Fluorosis is now worldwide problem not only India. the 20 developing countries like Argentina, U.S.A., Algeria, Libya, Turkey, Iran, China, Australia, south Africa, Kenya, Iraq, Srilanka, Canada, Thailand, Newzealand, Japan, and India etc[9-14]. But in the era of economical growth groundwater is getting polluted due to urbanization & industrialization. Presence of various hazardous contaminants like fluoride, nitrate, sulfate and other heavy metals etc. in underground water has been reported from different parts

of India. It is well established that India has two acute public health problem induced by utilization of groundwater as a source of drinking water having excess fluoride and arsenic though the origin of these two hazardous elements is attributed to geological reasons. In India fluoride is major inorganic pollutant which natural origin in groundwater. In this paper, the data interpreting to fluoride concentrations in the groundwater of Aurangabad district in Maharashtra state of India has been presented.

Study area

The area under the Study fall in Aurangabad district, in Kannad tehsil situated in western part of the Kannad city nearly 25 km. away. The Latitude of the study area is $20^{o}26'$ N and The Longitude is : $75^{o}13'$ E. The village of Jehur- Mungsapur located western region of Kannad tehsil. Groundwater is the source of water, used for domestic purposes. The lithology is also responsible for the quality of groundwater.

MATERIALS AND METHODS

3.1 Instruments & Chemicals

Fluorides colour comparator: The fluorides test kit contains a colour comparator, which has five numbers colour slots of colour, ranging from Red to yellow corresponding to the fluorides content in the water sample [15-16].

3.2 Sampling:

Ten drinking water samples were taken from ten Bore wells. Good quality half litre polythene bottles were used for sample collection. Samples were collected directly in the rinsed bottles without using any preservatives, from hand tube wells, bore well. After the water samples were transported to the laboratory, fluoride analyses were performed immediately. These analyses were done in the months from August- September 2014 as shown in Figure 1.

Figure 1 Collection of Sample from the various Areas

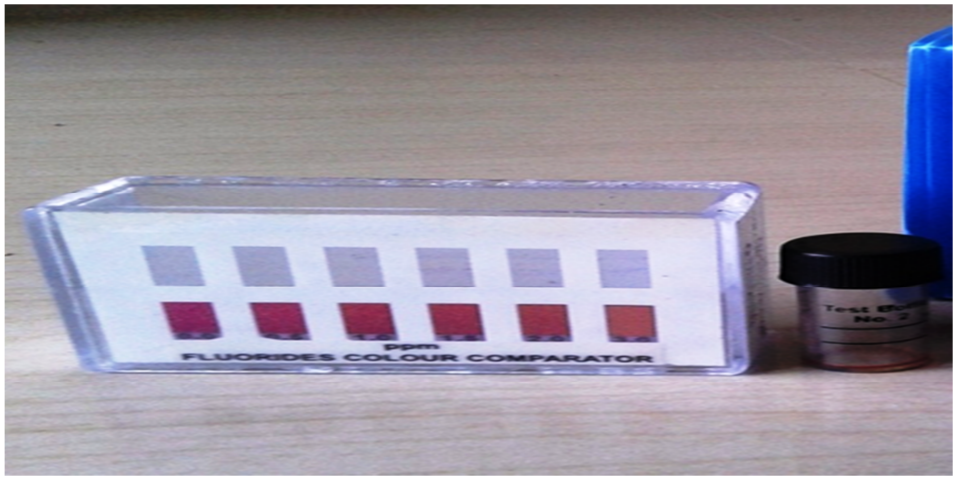

Figure 2 Determination of fluoride in water by using kit

Matching the colour For matching the colour of test water with the colours on the Comparator, place the test bottle (3 ml) contain water sample with Fluoride test reagent in comparator. Hold the comparator against light, placing it between source of daylight and the observer, at his eye level. Match the colour of test water with colour on

comparator. There are six numbers colour slots provided for fluorides contents corresponding to 0.0, 0.5, 1.0, 1.5, 2.0 and 2.5 ppm level as shown in Figure 2.

The Water temperature measure by micro thermometer and pH value of water sample under investigation was measured using digital pH meter. The pH meter was standardising by buffer of pH 4.0 and pH 9.2 and Alkalinity and Hardness was determined by titrimetric method.

3.3 Determination of Fluoride

Take 3 cm^3 sample in a test bottle, then add 8 to 10 drop of Fluoride test reagent, shake well and place the test bottle contain water sample with Fluoride test reagent in comparator. Hold the comparator against light, placing it between source of daylight and the observer, at his eye level. Match the colour of test water with colour on comparator then record reading one by one.

Table – I: Fluoride concentration and other physico-chemical parameters of ground and surface water of study area

Sr. No.	Well Location	Source	Temp. ^oC	pH	Alkalinity Mg/l	Hardness Mg/l	Fluoride Mg/l
1.	Rindhe farm	BW	**29.2**	**7.1**	**48**	**187**	**1.6**
2.	Near Hanuman Mandir	BW	**30.3**	**7.2**	**38**	**196**	**1.7**
3.	Near grampanchyayat	BW	**28.5**	**7.0**	**40**	**183**	**1.4**
4.	School Campus	BW	**29.9**	**7.7**	**40**	**196**	**1.8**
5.	Bapu Rindhe	BW	**28.6**	**6.9**	**44**	**179**	**1.4**
6.	Sahebrao Pawar	BW	**29.6**	**7.2**	**45**	**195**	**1.5**
7.	Banjara vasti	BW	**28.7**	**7.1**	**40**	**195**	**1.7**
8.	Vadacha Mala	BW	**29.0**	**7.8**	**44**	**199**	**1.9**
9.	Near Samaj Mandir	BW	**29.2**	**7.9**	**46**	**208**	**2.0**
10.	Jagnnath Rindhe	BW	**29.6**	**7.2**	**37**	**191**	**1.6**

All Samples collected from Jehur-Mugsapur Village (*BW: Bore Well)*

RESULTS AND DISCUSSION

From the Above project various conclusions are derived by our experiences during the field work.
1. Fluoride is present in surface water as well as in subsurface water in the study area of Aurangabad District.
2. Fluoride is Presence due to fluoride content minerals occurring in soil and rock in the Area.
3. Fluoride generally occurs in Fertilizers and pesticides.
4. Dental Fluorosis is occurring is due to increasing percentage of the Fluoride in water.
5. PH value of the water sample is higher in Jehur-Mungsapur is 7.9 found in study area which is located near Samaj Mandir.
6. Alkalinity value of water sample is higher in Jehur-Mungsapur is 48 mg/l found in study area which is located Rindhe farm.
7. Fluoride value of water sample is higher in Jehur-Mungsapur is 2.0 mg/l found in study area which is located near Samaj Mandir.

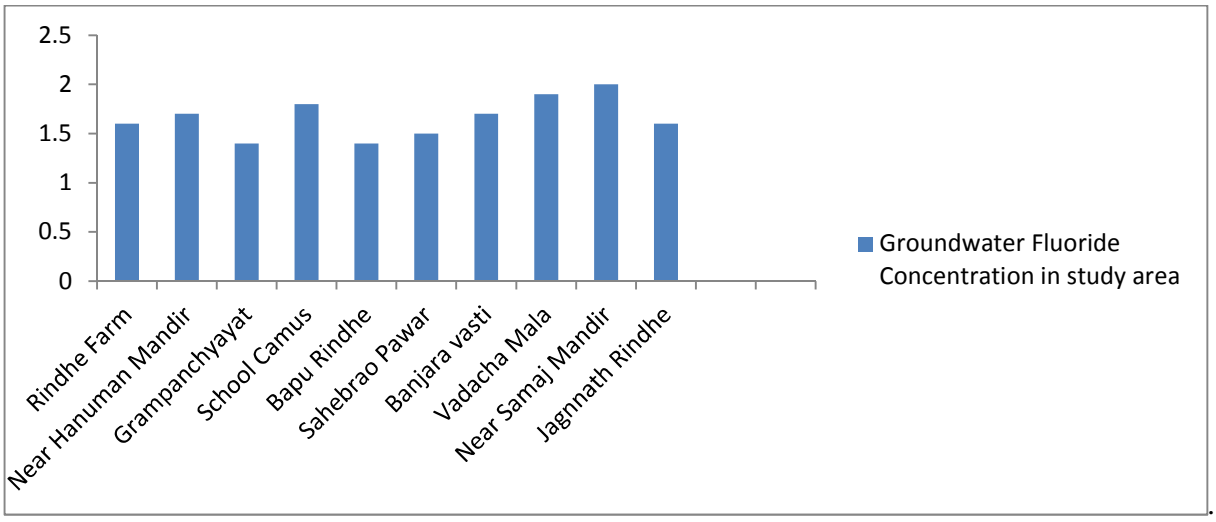

Figure 3 Groundwater Fluoride Concentrations in Study Area

CONCLUSION

The significance of fluoride in water has always been subject of debate. Whereas an intake fluoride is less quantity (less than 1 ppm) is known to be beneficial for human health in preventing in dental caries high fluoride concentration in water causes dental and skeletal fluorosis, In this method determination of fluoride study can be easily.

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REFERENCES

[1] D. Chakraborti ,*Curr. Sci.*, **2000**, 78(12), 1421 – 1423.
[2] APHA. Standard method for the examination of the water and wastewater. 17th edition, American Public Health Association, New York, U.S.A, **1989.**
[3] WHO, Guidelines for Drinking water Quality, World Health Organization, 1, **2004**
[4] WHO, "Fluoride in Drinking-Water," IWA Publishing, London, **2006**, pp. 1-3, 83-95.
[5] W. Czarnowski, K. Wrzesniowska and J. Krechniak, *Science of the Total Environment*, Vol. 191, No. 1-2, **1996**, pp. 177-184.
[6] S. M. Maliyekkal, S. Shukla, L. Philip and I. M. Nambie, *Chemical Engineering Journal*, Vol. 140, No. 1-3, **2008**, pp. 183-192.
[7] Apambire, W. B., Boyle, D. R. and Michel, F. A., *Environ. Geol*., **(1997)**, 33,13.
[8] Bell, M.C. and T.G. Ludwig, 1970, The supply of fluoride to man: ingestion from water, fluorides and human health, W.H.O. Monograph series 59, World Health Organization, Geneva.
[9] Boyle, D. R. and Chagnon, M., Can. *Environ. Geochem. Health*, **(1995),** 17, 5.
[10] Daines, R.H., I.A.Leone and E.Brennan, 1952, *Phytopathology*. (Abstr).42:112
[11] ISI, Drinking water standards, Table 1. Substance and characteristics affecting the acceptability of water fordomestic use 18, 10500. Indian Standard Institution, New Delhi, **1983**.
[12] JAOAC, *Journal of Association of Analytical Chemist* , **(1975)**, 5, 8477
[13] Kalsiwal, R.M. and Soloman, S.K., *J. Asso. Phys. India*., **(1959),** 756.
[14] Mameri, N., Yeddou A.R., Lounici H., Grib H., Belhocine D., and Bariou B., *Water Research*, **(1998)**, 32(5) 1604.
[15] Pravin Chavan, Pravinkumar Nagore, Sachin Bangale, *International Journal of Green Chemistry and Bioprocess* **2014**; 4(4): 14-16.
[16] Pravin Chavan ,Sachin Bangale, *Der Chemica Sinica*, **2014**, 5(5):77-80