International Multidisciplinary Research Journal 2012, 2(3):04-05
ISSN: 2231-6302
Available Online: http://irjs.info/

INTERNATIONAL MULTIDISCIPLINARY RESEARCH JOURNAL

Fluorides in the ground waters of Amravati district (M.S), India

A.U. Kakde[1], J.L.Tarar[2] and S.P. Ingole [3]

[1]Department of Environmental Studies,Vidya Bharti College, Amravati (M.S.), India
[2]Department of Environmental Science, Institute of Science, Nagpur (M.S.), India
[3]Department of Environmental Science, Shri Shivaji Science College, Amravati (M.S.), India

Abstract
India is one of the important country on the world map and ranks 3rd for its water reservoirs. Although it is blessed with these reservoirs ground water constitutes the main reliable source for drinking water. The concentration of elements is of great concern. Keeping in mind the dilema of fluoride and its impact the present study carried out for Amravati district where major portion of population rely on the ground water source. Consumption of excessive fluorides in drinking water causes dental decay and physiological deformities. In the present study it is observed that some glimpses of Nimbhi and Daryapur are above the prescribed limits. A variation in concentration is seen with the change in season. Some spots like Mullapua, Amravati are approaching the verge of contamination. Need for continuos and recurrent monitoring of water will be helpful for betterment.

Keywords: Ground water, fluorides, effects,precautionary measure.

INTRODUCTION

Water is an essential component for life on the earth which contains minerals extremely important in human health [1] Supply of fresh and clean drinking water is the basic need for all human beings on earth. India's population and climatic heterogeneity depicts that the fresh water withdrawal for various use is the highest at around 380 km^3 /yr which 155 $km^3$is for Pakistan, 22 km^3 for Bangladesh and 6 km^3 for Srilanka. It is expected in the next 30 years that India as a whole will come under the grouping of "water shtressed" countries [2 and 3]. The contamination of soil, ground water and surface water by heavy metals or metalloids has become a major environmental and public health hazard and a major constraint to sustainable development in many countries of Asia and Pacific. Along with the depletion of water levels the pollution of water bodies is becoming a matter of serious concern and attention is needed. For developing sustainability both quality and quantity of water resources need to be monitored and preventive and mitigative measures need to be taken.

In the present study Fluoride which is a widely spread element and ranks 13th in abundance on our planet [4] is taken.Fluoride ion in drinking water is known for both its beneficial and detrimental effects on health.

According to WHO and ICMR's guidelines the value of fluoride is 1.5 mg/lit. [5 and 6] . Fluoride does not occur in the elemental state in nature and exists in earth's crust in the form of number of fluorides minerals such as fluorspar, cryolite and fluorapatite. Fluoride is well known for its contamination of ground water reserves (Latha et.al., 1998)

Received: Jan 03, 2012; Revised: Feb 06, 2012; Accepted: March 12, 2012.

*Corresponding Author
A.U. Kakde
Department of Environmental Studies,Vidya Bharti College, Amravati (M.S.), India

Email: sangita_pi@rediffmail.com

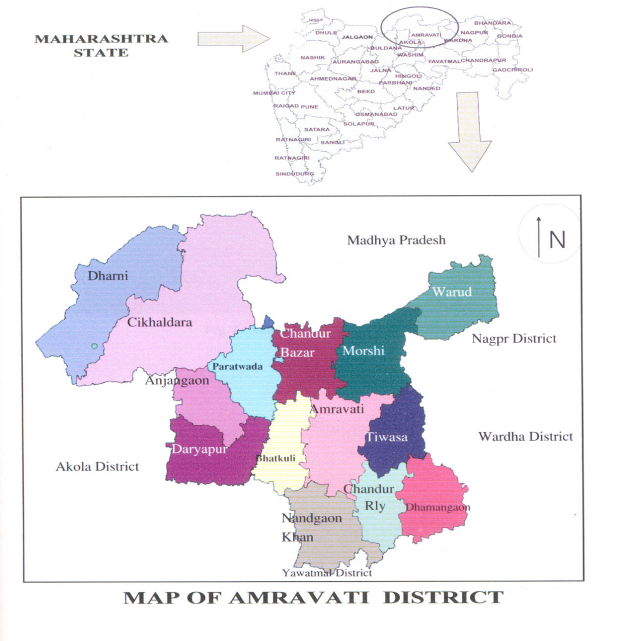
Abnormal levels of fluoride are common in the fractured hard rock zone with pegmatite veins. The veins are composed of minerals such as topaz, fluorite, fluor-apatite, villuamite, cryolite and fluoride replaceable hydroxyl ions in Ferromagnesium silicates. Fluoride ions from these minerals leach into the groundwater and contribute to high fluoride concentrations. Occasionally, mica group of minerals such as muscovite and biotite also contribute to water fluoride content. Fluorospar occurs in structurally weak planes such as shear fracture zones, joints and at the contact of host rock and vein quarte. Rock minerals weathered form calcium and magnesium carbonates, serve as good sinks for fluoride ions [7]. However it is the leachable state of fluoride ions that determines the water fluoride levels. The leachability is governed by pH of the draining solns and dissolved Co_2 in the soil [8]. Fluoride in water is common in groundwater sources. Minerals containing fluoride compounds slowly dissolve in the underground water ways and make their way in to well water. Fluoride is artificially released into the ecosystem through aluminium smelters phosphate processing, coal combustion and manufacturing of steel, bricks and glass products.

Abnormal level of fluoride in water is common is fractured hard rock zone with pegmatile vein [9]. The prevalence of fluorosis is mainly due to the intake of large quantities of fluoride through drinking water as reported in many states of India [10,11, 12, 13, 14 and 15] . The infiltration of waste water from cess pods and septic tanks into ground water is the major source of water pollution.

MATERIALS AND METHODS

Sample collection and analysis

A total of 4 Talukas with 12 villages belonging to Amravati district (M.S.) were includes in this study. The samples were collected during summer, winter and rainy seasons from the open wells in the study area. Samples were collected in pre cleaned high density polyethylene cans and stored at 4^0C before analysis. Fluoride level is measured by using fluoride meter of HANNA HI 93739 Fluoride High Range ISM.



MAP OF AMRAVATI DISTRICT

RESULTS

A total of 12 samples were collected from 2 villages of 4 talukas in Amravati district. Among these villages Nimbhi, Amravati and Daryapur show the values beyond the standards. Rest of the places is below the maximum permissible limits. Harisal and Sainagar, Daryapur are at verge of fluoride contamination. Only 3 samples were below 0.5 mg/lit. of fluoride level.

Table 1. Fluorides values during summer, winter and Rainy seasons of the year from December 2006 to December 2007

S.No.	Talukas	Amravati		
		Winter	Summer	Rainy
1	Morshi	0.7	06.	0.2
2	Yerala	0.8	0.5	0.6
	Nimbhi	1.9	1.7	0.9
3	Amravati	0.7	0.85	1.6
4	Walgaon	0.5	0.65	0.9
5	Naya-Akola	0.4	0.6	0.9
6	Dharni	0.7	0.8	0.8
7	Harisal	0.9	1.2	0.9
8	Bhokarbardi	0.7	0.7	0.8
9	Sainagar Daryapur	1.2	1.6	1.0
10	Kalamgavahan	0.7	0.9	0.9
11	Mallpura	1.3	0.92	1.6

DISCUSSION AND CONCLUSION

This study first time discovered the places of Nimbhi, Daryapur of Amravati district which have high fluoride in the well water. Frequent monitoring and defloridation are fruitful ways to minimize future consequences of fluoride. Boiling the water mostly for disinfection may concentrate the fluoride consequences. So awareness regarding the use of water is the need. Continuous monitoring and water quality analysis by government should be frequent to keep the people safe from the problem of fluoride pollution. Mapping of high fluorite areas is useful to plan meticulously to bring safe drinking water from low fluoride areas. Awareness campaigns about fluoriosis and remedial methods need to be carried out in the villages as well as in schools using pamphlets and audio visual aids.

REFERENCES

[1] Virkatyle, J. and Sillanpaa, M. 2005. Chemical evaluation of potable water in Eastern Qinghai Province, China: human health aspects, Environ Int. In press.

[2] Subramanian, V. 2000. Transfer of phosphorus from the Indian subcontinent to the adjacent oceans. Society of sedimentary Geology, *SEPM special publication.* 66: 77-88.

[3] Subramanian, V. 2004. Water quality in south Asia. *Asian J. of water, Environment and pollution*.1: 41-54.

[4] Mason, B. and Moore, C.B. 1982. Principles of Geochemistry, 4th edition. Wiley , New York. pp- 386-99.

[5] World Health Organization (WHO) 1963. International standards for Drinking Water, 2nd ed. Geneva.

[6] Indian Council of Medical Research (ICMR). 1975. Manual of standards of quality for drinking water supplies, Vol.44. Special Report Series, 2nd ed., New Delhi, India.

[7] Jacks, G., Sharma, V.P. and Sharma, G.K. 1980. Hydrochemical studies, SIDA – assisted groundwater project in Kerla – report. pp-1-5.

[8] USE PA. 2004. Available online: http:www.epa.gov/ safewater/ hfacts. html (13-7-2004).

[9] Ramesan, V. and Rajgopalan, K.J. 1985. Fluoride ingestion into the natural waters of hard rock, Areas, peninsular. *IndiaJ. Geol, Soci.* 26: 125-32.

[10] Siddiqui, A. H. 1955. Fluorosis in Nalgonda District Hyderabad – *Decean Dr.Mad.J.* 2:1408-13.

[11] Jolly, S.S., Prasad, S., Sharma, R. and Chander, R. 1973. Endemic fluorosis in PunjabI. Skeletol aspects. *Fluoride.* 6:4-18.

[12] Testia, S.P.S. and Teotia, M. 1991. Endemic fluoride: bones and teeth-update *Ind J.Environ. Toxicol.*1(1): 1-16.

[13] Susheela, A. K., Kumar, A., Bhatnagar, M. and Bahadur, R. 1993. Prevalence f endemic fluorosis with gastrointestinal manifestation in people living in some north-Indian villages. *Fluoride.* 26(2): 97-104.

[14] Kerthikeyan, G., Anitha, P. and Apparao, B.V. 1996. Contribution of fluoride in water and food to the prevalence of fluorosis in areas of Tamil Nadu in South India. ISFR, *fluoride.* 29:151-5.

[15] Vishwanathan Gopalan, Jaswanth, A., Gopalakrishnan, S. and Sivaiango, S. 2009. Mapping of fluoride endemic areas and assessment of fluoride exposure. Science of the total environment. 402:1579-1587.