International Research Journal of Natural and Applied Sciences
ISSN: (2349-4077)
Impact Factor 5.46 Volume 6, Issue 12, December 2019
Website- www.aarf.asia, Email : editor@aarf.asia , editoraarf@gmail.com

STATUS OF FLUORIDE CONCENTRATION IN DIFFERENT BLOCKS OF MAHENDRAGARH DISTRICT, HARYANA

1. Samesh Chand, Research Scholar, Department of Chemistry, Singhania University, Pacheri Bari ,Jhunjhunu, Rajasthan.
2. Dr. Sarita Tiwari , Assistant Professor, Department of Chemistry, Singhania University, Pacheri Bari ,Jhunjhunu, Rajasthan.

Abstract

The rise and development of cultural complexity in human society has been greatly aided by water. Fluoride pollution of water and soil has grown to be a significant issue. In the current study, the fluoride concentration was assessed using the zirconium alizarin method in 160 groundwater samples taken from various blocks in the Mahendragarh district of Haryana. Mahendragarh, Nangal Chowdhary, Narnaul, Nizampur, and Shima block were found to have fluoride concentrations over the WHO-permitted level of 1.5 mg/l.

Keywords: Fluoride , Groundwater, Mahendragrah, Haryana.

Introduction

Literally, water is the planet's wellspring of life. It is a crucial natural resource for maintaining life and the environment, which we have long believed to be nature's unmerited and abundant gift. Water has been crucial to the expansion and development of human society's cultural complexity (Pandey et. al; 2003). More than half of the world's population depends on groundwater for survival. Around the world, 80% of human diseases are mostly caused by contaminated drinking water (WHO, 1984). More than 200 million people rely on these fluoride-contaminated water sources worldwide (Ayoob and Gupta, 2006). In the bulk of the dry and semi-dry regions of the Indian subcontinent, there is a high concentration of fluoride in the groundwater. Fluoride pollution of water and soil has grown to be a significant issue. Fluoride is a small component of groundwater that can be found in both urban and rural parts of India and in all hydrogeological structure categories where drinking water is found.

The pollution with fluoride is increased by numerous anthropogenic and natural causes. It is naturally created in the soil and water by the chemical breakdown of minerals that contain

fluoride. The industrial sources of fluoride compounds are from the production and use of phosphate fertilizer and pesticide, the production of steel, glass, ceramic and glue, the processing of copper, nickel and phosphate and burning of coal. These industries emit the fluorine compound and these compounds reach the soil through many processes.

More than half of the world's population depends on groundwater for survival. Around the world, 80% of human diseases are mostly caused by contaminated drinking water (WHO, 1984). More than 200 million people rely on these fluoride-contaminated water sources worldwide (Ayoob and Gupta, 2006). In the bulk of the dry and semi-dry regions of the Indian subcontinent, there is a high concentration of fluoride in the groundwater. In India, the levels of fluoride pollution range from 1.0 to 48.0 mg/l (Susheela, 2001). Studies on fluoride levels in ground water in India revealed significant levels of the chemical in different regions of the nation (Gupta et al. 1993; Handa 1975; Indu et al. 2007; Reddy et al. 2007; D. Reddy et al. 2010; .A. Narsimha 2018; S.Yadav et. al .2019).

High fluoride concentration in groundwater occurs in most of the dry and semi-dry zones of the Indian subcontinent. Mahendragarh district of Haryana state is identified as Red Alert Zone of high fluoride by Geological survey of India (GSI). Mahendragarh district has very weak and limited rainfall and canal network system. Therefore, groundwater is the only source to fulfill the demand of domestic, agriculture and industrial purposes for residents of this area. The present study focus on the Fluoride concentration status in all blocks of Mahendragarh distrct , Haryana .

Methodology

Sampling Collection

Total 160 (20 from each Block) Water samples from various groundwater water sources were collected from different villages of eight blocksof Mahendragarh district to evaluate the fluoride ion in water. Samples were collected in pre-washed plastic bottles and carried to the laboratory. The collected samples were kept in plastic containers in dark place at room temperature.

Sample analysis

The Zirconium Alizarin Method was used to determine the fluoride of the sample. The procedure was carried out in accordance with IS 3025(P-60). The fluoride detection threshold was 0.05 mg/l. Zirconium alizarin reagent and standard sodium fluoride solution were added to the water sample before it was taken. The temperature of the standards and sample was the same (10 ^{o} C to 20^{o}C). After an hour of standing, the colours were blended and compared.

The amount of standard sodium fluoride solution that was in the tube where the sample under test was taken matched was noted.

Calculation:

$$\text{Fluoride, mg/l} = \frac{1000 \times W}{V}$$

Where

W = weight of fluorides in the standard solution.

Results and Discussions

Table-1: Average Value of Fluoride Concentration in Groundwater samples of Different Block of Mahedragarh district, Haryana**.**

S.No.	Name of Block	Fluoride Concentration (Mg/l)
1	Ateli Block	0.74
2	Kanina	1.36
3	Mahendragarh	2.32
4	Nangal Chowdhary	2.80
5	Narnaul	2.02
6	Satnali	0.70
7	Nizampur	1.68
8	Shima	2.48

The presence of fluoride in water from different villages in the eight Mahendragarh block was analysed. The observed data reveals that fluoride content increased in the different villages in the eight Mahendragarh block. We evaluated the data from 20 samples from each block, for a total of 160 samples. Fluoride levels ranged from 0.4mg/l to 1.2mg/l in the Ateli block, with an average of 0.74mg/l. The sampling sites/villages were classified as having a low fluoride level (1.5mg/l) and sampling sites/villages with a high fluoride level (>1.5mg/l). Fluoride levels in kanina block ranged from 0.5 mg/l to 2.3 mg/l, with an average value of 1.36 mg/l. In the Mahendragarh block, concentrations ranged from 1.1mg/l to 5.8mg/l, with an average of 2.32mg/l. 1.1- 5.9 mg/l with an average value of 2.80mg/l (Nangal Choudhary), 1.6-2.5mg/l with an average value of 2.02mg/l (Narnaul), 0.3-0.9mg/l with an average value of 0.7mg/l (Satnali), 1.3-2.2mg/l with an average value of 1.68mg/l (Nizampur), and 1-5mg/l

with an average According to the current investigation, the majority of blocks in the Mahendragarh district have higher fluoride levels (>1.5mg/l). Ateli and Satnali are classified as having low fluoride content (1.5mg/l). Fluorine is an element that occurs naturally, is extensively distributed in nature, and is thought to be the thirteenth most plentiful element in the universe. Because it is the most electronegative and reactive of all the elements, fluorine does not naturally occur as elemental fluorine but rather as fluoride (F) mineral complexes. F is thought to be a crucial component in animals, even though it is widely dispersed in soils, plants, and animals. As a result, there are significant regional and national differences in the amount of fluoride present in natural surface water and ground water. The high F concentration in natural water is controlled by leaching and modification processes. During weathering, fluorine is liberated as fluoride (F-). F behaves differently chemically in natural water than the other halogen elements do.

Fluorosis in humans has been linked to excessive fluoride ingestion, which is mostly caused by drinking water in the majority of developed nations. Table 1 shows the the fluoride limits set by the BIS and WHO for drinking water. In India, Pakistan, West Africa, Thailand, China, Sri Lanka, and Southern Africa, high groundwater fluoride concentrations have been linked to igneous and metamorphic rocks such granites and gneisses. According to Agrawal, V., et al.(2001) the issue of high fluoride concentration in ground water sources has emerged as one of India's most significant health-related geo-environmental challenges . Fluoride levels in natural water vary depending on the water's source, the kind of geological formation, and the amount of rainfall. While subsurface water often has high fluoride concentrations, surface water typically has low fluoride levels. The World Health Organization (1996) established a recommended value of 1.5 mg/1 as the maximum allowed level of fluoride in drinking waters in response to the possibly hazardous effects of high fluoride waters. However, while establishing national limits for fluoride, it is crucial to take into account climatic conditions, the amount of water consumed, nutrition, and other aspects. Because fluoride intake dictates health impacts, norms are bound to differ between temperate and tropical countries, where much more water is drank. Although water is the most common source of fluoride intake, exposure through diet and air may be relevant in some cases. Being a component of fluoroapatite in the mineral portion of bones and teeth, fluorine is a necessary element for human growth. The length and intensity of exposure determine fluoride's effects on health. Fluoride is good for you in small quantities and can help keep your teeth from getting cavities. Teeth that are discoloured, blackened, mottled, or chalky white are signs of dental

fluorosis. The teeth's function is unaffected, only their look. These symptoms have been linked to excessive fluoride exposure in youth (age 10), when teeth were still forming. Enamel formation is finished by the time a person is eight to ten years old, thus dental fluorosis won't happen. Fluorine intake that is beyond the safe limit for a very long time or in extremely high doses can cause skeletal fluorosis, which causes severe and long-lasting changes to the bones and joints (WHO, 2002).

Conclusion

The results of present study showed that out of 8 blocks of the district, the fluoride level in water in 3 blocks have been found within the permissible limit of 1.5mg/l as prescribed by WHO. The fluoride concentration in 5 Blocks is above permissible limit which leads all types of fluorosis among residents of the district.

References

1. Adimalla Narsimha, Venkatayogi Sudarshan (2018).Data on fluoride concentration levels in semi-arid region of Medak, Telangana, South India,Data in Brief,Volume 16,Pages 717-723,
2. Agarwal, K. C. (2001). Environmental Pollution: Causes, Effects & Controls. Nidhi Publishers (India).
3. Ayoob, S., & Gupta, A. K. (2006). Fluoride in drinking water: a review on the status and stress effects. Critical Reviews in Environmental Science and Technology, 36(6), 433-487.
4. D.V. Reddy, P. Nagabhushanam, B.S. Sukhija, A.G.S. Reddy, P.L.(2007) Smedley,Fluoride dynamics in the granitic aquifer of the Wailapally watershed, Nalgonda District, India,Chemical Geology,Volume 269, Issues 3–4,
5. Gupta, S. C., Rathore, G. S., & Doshi, C. S. (1993). Fluoride distribution in groundwaters of southeastern Rajasthan. Indian Journal of Environmental Health, 35, 97-109.
6. Handa, B. K. (1975). Geochemistry and genesis of Fluoride-Containing ground waters in india. Groundwater, 13(3), 275-281.
7. Indu, R., Krishnan, S., & Shah, T. (2007). Impacts of groundwater contamination with fluoride and arsenic: affliction severity, medical cost and wage loss in some villages of India. International Journal of Rural Management, 3(1), 69-93.
8. Pandey, D. N., Gupta, A. K., & Anderson, D. M. (2003). Rainwater harvesting as an adaptation to climate change. *Current Science*, *85*(1), 46-59.

9. Reddy, A. G. S., Reddy, D. V., Rao, P. N., & Prasad, K. M. (2010). Hydrogeochemical characterization of fluoride rich groundwater of Wailpalli watershed, Nalgonda District, Andhra Pradesh, India. *Environmental Monitoring and Assessment*, *171*(1), 561-577.
10. Sucheta Yadav, Sudhir Kumar Bansal, Sanjay Yadav, Sunil Kumar (2019). Fluoride distribution in underground water of district Mahendragarh, Haryana, India. Applied Water Science, 9:62 https://doi.org/10.1007/s13201-019-0935-7
11. Susheela, A. K. (2001). Fluorosis: Indian scienario: A treatise on fluorosis. Fluorosis Research and Rural Development Foundation. 34(3), 181-183.
12. World Health Organization (WHO) (2002). Environmental health criteria. Fluorides. Geneva. 227-251.
13. World Health Organization & International Programme on Chemical Safety. (1996). gniknird rof seniledиG-ytilauq retaw. loV. 2, rehto dna airetirc htlaeH noitamrofni gnitroppus, 2nd ed. rO htlaeH dlroWganization.
14. World Health Organization. (1984). Fluorine and fluorides.