

ORIGINAL ARTICLE

Estimation of Fluoride Concentration in Groundwater in Chennekothapalli, Anantapur District, Andhra Pradesh (India)

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ABSTRACT

The occurrence of fluoride in groundwater has attracted attention globally since its considerable concentration in groundwater has become one of the most important health-related geo-environmental issues. The present study was carried out to estimate the fluoride concentration in groundwater in Chennekothapalli Mandal, Anantapur district, Andhra Pradesh. Two water samples were collected and fluoride levels were analysed by standardized analytical method (SPANDS colorimetric method) by chief Water Analyst, State Level Water Testing Laboratory, Tamil Nadu Water Supply and Drainage Board (TWAD), Government of Tamil Nadu. The fluoride concentration in groundwater of this area was 1.46 and 1.68mg/dl. In the study area the residents are dependent on the groundwater for domestic use which has been proved to have higher than permissible levels of fluoride concentration.

Keywords: Groundwater, Fluoride concentration, Anantapur District, Andhra Pradesh.

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INTRODUCTION

Occurrence of fluoride in groundwater has drawn worldwide attention due to its considerable impact on health. The maximum tolerance limit of fluoride in drinking water specified by World Health Organization is 1.5mg/dl. Ingestion of water with fluoride concentration above 1.5mg/dl results in dental fluorosis characterized initially by opaque white patches staining, mottling and pitting of teeth. Skeletal fluorosis may occur when fluoride concentration in drinking water exceeds 4-8mg/l, which leads to increase in bone density, calcification of ligaments, rheumatic pain in joints and muscles along with stiffness and rigidity of the joints, bending of the vertebral column, etc [1].

In India, there has been an increase in incidence of dental and skeletal fluorosis with about 62 million people at risk [2] due to high fluoride concentration in drinking water. Dental fluorosis is endemic in 14 states and 150,000 villages in India with the problem most pronounced in the states of Andhra Pradesh, Bihar, Gujarat, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh. [3] It is cited that dental fluorosis levels of 43% has been reported in Anantapur District of Andhra Pradesh. [4].

In view of the increased interest in recent years in fluoride (F⁻) concentrations in groundwater and impact to human health, the present study was focused on determining the F⁻ levels in the water from 2 borewells collected from Medapuram village post, Chenne Kothapalli Mandal, Anantapur district, Andhra Pradesh.

MATERIALS AND METHODS

Estimation of fluoride in drinking water: Total of 2 groundwater samples each 500 ml (used for drinking purpose) collected from bore wells which were extensively used for drinking and other domestic purposes, during June 2014 in pre cleaned dry sterilized polythene container and labelled with information like date of collection, source and place was colourless, odourless and clear. Fluoride levels were analysed by standardized analytical method (SPANDS colorimetric method) by chief Water Analyst, State Level Water Testing Laboratory, Tamil Nadu Water Supply and Drainage Board (TWAD), Government of Tamil Nadu, Chennai (ISO 9001-2000 – certified)

Table 1: Estimated amount of Fluoride concentration in groundwater

Chemical Examination	Acceptable limit*	Permissible limit*	Sample 1	Sample 2
Fluoride mg/l	1.0	1.5	1.68	1.46

*As recommended by WHO

RESULT AND DISCUSSION

In general, the ground water samples collected had no colour, odour and turbidity. Table 1 shows the fluoride concentration in groundwater from 2 borewells in Chennekothapalli Mandal, Anantapur district, Andhra Pradesh. Similar studies show that the fluoride concentration in the groundwater in Parts of Kadapa and Anantapur Districts ranged from 0.2 to 3.2 mg/L [5,6]. In a study conducted in Anantapur district by V.Sunitha et al (2012), fluoride concentrations was shown to be varying between 0.5 to 5.5mg/l, and 90% of the collected samples had fluoride concentration above the permissible level [7]. In this study it was found that fluoride concentration was 1.46 and 1.68mg/L. Hence the water is not suitable for drinking purposes.

CONCLUSION

From this study it is evident that residents of Chennekothapalli Mandal, Anantapur district are dependent on the groundwater for domestic use which has been proved to have higher than permissible levels of fluoride concentration. So remedial measures such as defluoridation and rain water harvesting need to be implemented. Nutritional diet such as calcium and phosphorus rich food should be recommended to those affected with fluorosis as it decreases the rate of accumulation of fluoride in the human body.

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REFERENCES

1. WHO (1984). Guidelines for drinking water quality, Vol. 12, Health criteria and other supporting information. World Health Organization, Geneva
2. Rao.R.J, Naidu.M.G.C.(1973) Geochemistry of high fluoride natural waters in Jaggaiahpalem, fluorosisendemic village near Visakhapatnam district, Andhra Pradesh, Inst. Symposium on Recent researches and applications of Geochemistry, Patna, India.: pp 6.
3. Subba Rao, N (1992). Factors affecting optimum development of groundwaters in crystalline terrain of the Eastern Ghats, Visakhapatnam area, Andhra Pradesh, India, Jour. Geol. Soc. India. 40(5):462-467.
4. Ibrahim M, Asimrasheed M, Sumalatha M, Prabhakar P (2011) Effects of fluoride contents in ground water: a review. International journal of pharmaceutical applications .2(2):128-134.
5. Sunitha1, J. Abdullah Khan, Muralidhara Reddy B, Prasad M, Ramakrishna Reddy(2014). Assessment of Groundwater Quality in Parts of Kadapa and Anantapur Districts, Andhra Pradesh, India. Indian Journal of Advances in Chemical Science 3: 96-101.
6. Sunitha V, Muralidhara Reddy B, Abdhulla Khan J, Ramakrishna Reddy M.(2012). Emerging Challenge: Fluoride Contamination in Groundwater in Parts of Kadapa District, Andhra Pradesh. Asian J. Exp. Biol. Sci. Vol 3(2) : 293-297.
7. Sunitha V, Muralidhara Reddy B,Ramakrishna Reddy M (2012). Assessment of roundwater Quality with special reference to fluoride in South Eastern part of Anantapur District, Andhra Pradesh. Advances in Applied Science Research, 3 (3):1618-1623.

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