

# CONCENTRATION OF FLUORIDE IN GROUND WATER ANALYSIS IN TRIPURANTHAKAM MANDAL, PRAKASAM DISTRICT

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## Abstract

The study carried by Tripuranthakam mandal, Prakasam district The fluoride concentration in ground water was determined in Tripuranthakam mandal of Prakasam district, Andhra Pradesh (India) where it is the only source of Groundwater with high and low concentration of fluoride is found in many parts of the world. Fluoride concentration is high in some water samples several villages viz Mittapalem, Ramsamudram, Sugalthanda etc, are also badly affected from Fluorosis. It is estimated that about 65 million people of India are suffer from Fluorosis. An inventory of fluoride concentration in drinking groundwater is important to curb spread of the disease fluorosis. This study was carried out to assess the quality of underground water of Tripuranthakam mandal in Prakasam district, Andhra Pradesh, India. During the year of 2017-18. Samples are analysed by SPDNS Method. The fluoride concentration along with various chemical parameters in ground water samples was determined in this region.

**Keywords:** Groundwater, Fluorosis, SPADNS method, Tripuranthakam

## Introduction:

Fluoride is an essential microelement for human health. However, if present in excess it contaminates groundwater **Apha (American Public Health Association) (2005)**. Fluoride is a major contaminant of groundwater reserves globally. Statistically, smaller quantities ( $1.0 \text{ mg L}^{-1}$ ) in drinking water are usually considered to have a beneficial effect on the rate of occurrence of dental caries, particularly among children (WHO 2006), but excessive continuous exposure ( $1.5 \text{ mg L}^{-1}$ ) to fluoride can give rise to a number of adverse effects, including dental fluorosis, skeletal fluorosis **Ayoobs(2006)**. Fluoride concentration in drinking water above the permissible level is well recognized globally as a public health concern. About 200 million people from 25 countries rely on water sources that contain excessive fluoride (**Ayoob and Gupta 2008**). Many countries (e.g., USA, China, India, Sri Lanka, Argentina, Mexico and many countries in Africa) are listed with high-fluoride ground water provinces **Cengelloglu Y(2002)**. Particularly, elevated fluoride concentrations above the World health Organization (WHO) guideline of  $1.5 \text{ mg/L}$  in ground waters have been reported in many parts of the Rift Valley regions. For instance, in the main Ethiopian Rift Valley about 14 million people rely on water sources that contain high concentrations of fluoride.

According to the report by fluoride water analysis of the hot springs, 75 % of the lakes, 54 % of the shallow wells and 35 % of the bore holes characterized in the main Ethiopian Rift Valley contain above  $5.0 \text{ mg/L}$  fluoride. This study also revealed that the presence of fluoride concentration above the guideline value outside the Rift Valley region in Ethiopia. Fluoride present in concentrations of  $1.5\text{--}2.0 \text{ mg/L}$  in drinking water gives rise to mild dental fluorosis, while values exceeding  $2.0 \text{ mg/L}$  may cause dental and skeletal fluorosis (WHO 1994)**Chen SG(1994)**. The WHO guideline recommends the fluoride content in drinking water to be in the range of  $1.0\text{--}1.5 \text{ mg/L}$  (WHO 2011)**Chen n,(2011)**. Therefore, treatment of all the water sources containing

fluoride above the acceptable level is essential for potable purposes. In human health, high levels of fluoride are related to bone and teeth diseases as well as with negative effects on the reproductive and nervous systems (Edmunds *et al.*(1996). In India, the excessive presence of fluorides in ground- water is present in nearly 177 districts covering 20 states and Telangana is one of them (Narsimha *et al.*, 2013). Approximately 62 million people including 6 million children suffer from fluorosis because of consumption of water with high fluoride concentrations (Susheela, 1999). The amount of fluoride occurring naturally in groundwater is governed by climate, composition of the host rock, and hydrogeology (Gupta *et al.*, 2006).The major sources of fluoride in groundwater are due to fluoride-bearing rocks

## Methodology:

The Present study was conducted in the year 2017-18 in the district of Prakasam, Andhra Pradesh state in India. Prakasam district, one among the 13 district of Andhra Pradesh state.it is extended over an area of 17,626 kilometers and has population of 3,392,764 (census,2011).The Prakasam district is bounded in the eastern by the Bay of Bengal, on the south by kadapa and Nellore district , on the west by Kurnool and on the north west by Mahabubnagar district of Telangana. Prakasam district is divided into 56 mandalas, which comprise the villages and hamlets.

A total 25 samples of the fluoride concentration were analysed and summarized in Table 1. The fluoride concentration ranged from 1.08 to 3.4 mg/l. out of the 25 samples 25 samples are the above than the permissible limit. The highest fluoride levels 3.05 observed at Mittapalem and lowest at Kankanalapalli and D.V.N Colony The mean values of Tripuranthakam mandal are 1.08.

The water samples are analysed by SPANDS method . it involves the reaction of fluoride with a red zirconium dye solution .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 . 100 ml of filtered samples, then 5 ml of zirconyl acide solution was added to it for the removal of SO<sub>4</sub> 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.

## RESULTS:

### TRIPURANTHAKAM MANDAL

NAME OF VILLAGE AND SOUECES	FLUORIDE CONCENTRATION (mg/L)	Fluoride permissible (0.8-1.0 mg/l)
Mittapalem (sc colony Handpump)	3.4	0.8-1.0 mg/l
M.P.U.P School,(Handpump)	3.3	0.8-1.0 mg/l
Bc colony (Handpump)	3.2	0.8-1.0 mg/l
Oc colony( Borewell)	3.2	0.8-1.0 mg/l
Bus stop (Borewell)	3.2	0.8-1.0 mg/l
Ramsamudram(mpp school(Borewell)	3.2	0.8-1.0 mg/l
Sc colony (Borewell)	2.7	0.8-1.0 mg/l
B.C Colony,(Handpump)	2.4	0.8-1.0 mg/l
Z.P.H.school,(Handpump)	2.1	0.8-1.0 mg/l

Oc colony (Borewell)	1.8	0.8-1.0 mg/l
<b>Kankanalapalli</b> (bc colony Borewell)	2.4	0.8-1.0 mg/l
Z.P.H.School,(Borewell)	2.4	0.8-1.0 mg/l
Mpp school(Borewell)	2.1	0.8-1.0 mg/l
Sc colony(Borewell)	2.1	0.8-1.0 mg/l
Rama mandir(Borewell)	2.1	0.8-1.0 mg/l
<b>Sugalithanda</b> (nagaraj colony)Borewell)	2.6	0.8-1.0 mg/l
Mpp school( Handpump)	2.6	0.8-1.0 mg/l
Bus stop (Handpump)	2.3	0.8-1.0 mg/l
Naik colony(Borewell)	2.6	0.8-1.0 mg/l
Anjaneya colony(Borewell)	2.4	0.8-1.0 mg/l
<b>D.v.n Colony</b> (mpp schoolHandpump)	2.3	0.8-1.0 mg/l
S.C colony,(Handpump)	1.9	0.8-1.0 mg/l
Bc colony (Handpump)	2.21	0.8-1.0 mg/l
Oc colony (Handpump)	2	0.8-1.0 mg/l
Bus stop( Borewell)	1.8	0.8-1.0 mg/l

The total 25 samples of the fluoride concentration were analysed and summarized in the TABLE 1 . the fluoride concentration ranges from 1.06 to 3.04 mg/L .out of the 25 samples 25 samples are the above than the permissible limit .the highest fluoride levels 3.04 observed at Mittapalem and lowest at D.V.N Colony.

In the study 25 samples are in the permissible level and 25 samples are above than the permissible limit. Especially in Tripuranthakam mandal Mittapalem and Ramsamudram villages is completely above than the permissible limit (1.8 and 3.4ppm). The result of the Tripuranthakam mandal is represented in the Graph as follows.

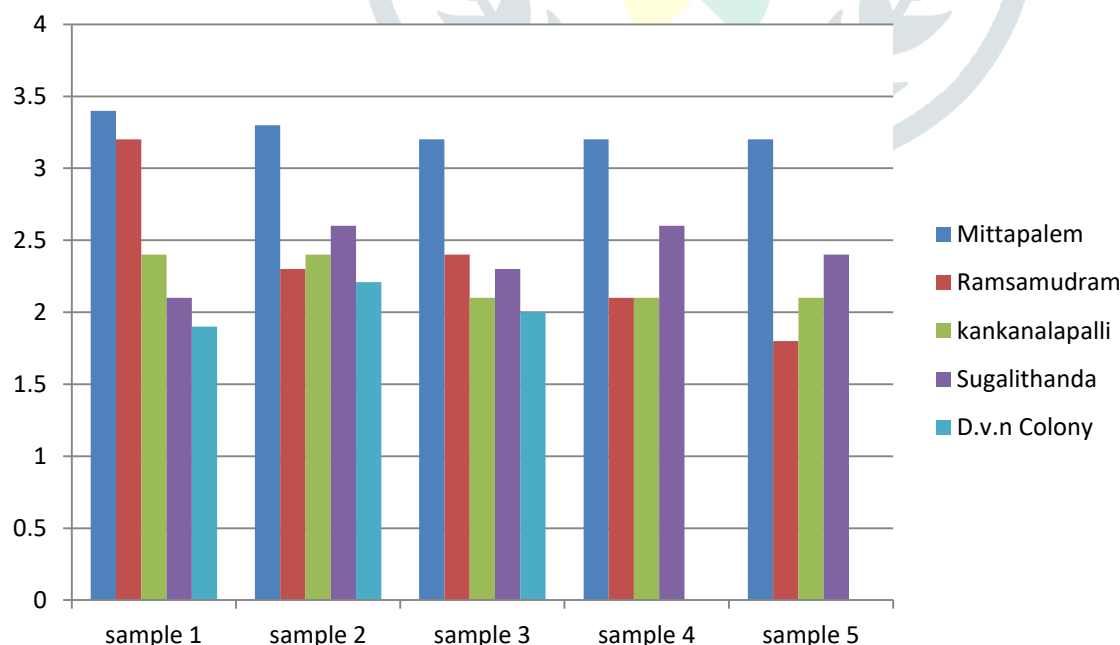


Figure: Graphical Representation of fluoride concentration in Tripuranthakam Mandal

## CONCLUSION:

The present study of fluoride ground water quality with reference to fluoride concentration in the prakasam district, Water quality is dependent on the type of the pollutant added and the nature of mineral found at particular zone of bore well. Monitoring of the water quality of ground water is done by collecting representative water samples and analysis. Fluoride concentration in the groundwater of the study area varied from 1.8-3.4 mg/l. All water samples are beyond the permissible limit, prescribed by WHO. High fluoride concentration in the groundwater was found in the study area may be due to the presence of fluoride in the rocks and their interaction with groundwater.

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