

# ESTIMATION OF FLUORIDE WATER ANALYSIS IN NEKARIKALLU MANDAL, GUNTUR DISTRICT

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## Abstract

The present work is a comprehensive study on the fluoride water analysis of the ground water of 6 villages of Nekarikallu Mandal, Guntur District, Andhra Pradesh in India, The results have indicated that the ground waters are un-suitable for drinking as they have fluoride concentration ranging from 0.8 to 1.0 mg/lit and the waters need treatment before consumption. Water samples from 6 villages of Nekarikallu Mandal were subjected to fluoride analysis using SPADNS method to confirm the fluoride levels in the drinking water before commencement of clinical examinations Nekarikallu Mandal of Guntur district (A.P) were examined for manifestations of dental, skeletal and non-skeletal manifestations of fluorosis.

**Keywords:** *Fluoride, Ground water, SPADNS method, Skeletal fluorosis*

## Introduction:

Ground water is one of the most broadly distributed and essential natural sources for domestic, industrial and agricultural purposes in all over the world. In India, most of the population use ground water as its primary source of drinking water **Jain C.K,2000 and Lilly Florence P,2012 (1-2)**. The ground water is polluted due to the rapid urbanization, improper disposal of industrial effluents and sewage in urban areas, hazardous wastes, increasing mining and petroleum operations, agricultural development activities particularly excessive application of pesticides and fertilizers and unsanitary conditions **Meenakshi and Maheshwari R,2006; Ramakrishnaiah, C.R,2009 (3-4)**. In addition, variations in natural and human activities are reflected in the hydro chemical parameters of the groundwater. The relationship between the ground water flow systems and ground water quality is an important aspect of ground water analysis. The differences in concentrations of dissolved ions in ground water are generally governed by human activities(5-6). The quality of ground water is stated by its quantitative and qualitative composition of suspended solids and dissolved minerals or organic compounds(7) .In India, research on the assessment of ground water quality especially with reference to fluoride has been carried out by various workers(8-9). Both fluoride (F) and hydroxyl (OH) ions have the same ionic radii and are roughly of the same size and hence they can easily replace each other in many rocks forming processes(10) . The quality of water in ground waters is a major concern for the mankind because human welfare is directly linked with it and so, the water quality regulating authorities such as World health organisation gives the fixed desirable and permissible limits of various fluoride levels (13-14). The desirable limits are safe limits and permissible limits are allowed only in the event of the absence of alternative sources. The correlation and regression coefficients of the water quality parameters help to assess the overall water quality.. In the present work a well known fluoride affected area, Nekarikallu Mandal of Guntur District of Andhra Pradesh, India has been chosen for ground water quality assessment with an emphasis on the fluoride levels and for investigating the remedial methods for the de-fluoridation of ground waters using active carbons derived from the plant materials of fluoride

## Methodology:

The Presented study was conducted in the year 2017-18 in the district of Guntur, Andhra Pradesh state in India. Guntur district, one among the 13 district of Andhra Pradesh state. It is extended over an area of 11,804 kilometers and has population of 4,887,813 (census, 2011). This district has a coast line of 100 kilometers. The Krishna river forms the north eastern and eastern boundary of the district, separating Guntur district from Krishna district. The Guntur district is bounded in the eastern by the Bay of Bengal, on the south by Guntur district, on the west by Mahaboob nagar and on the north west by Nalagonda district. Guntur district is divided into 57 mandalas, which comprise the villages and hamlets.

A total 25 samples ground water samples were collected from borewell and open wells which used for drinking water. The samples are collected simple random sampling. In Nekarikallu mandal samples were selected Chimalamarri, Challagundla, Kunkalagunta, Thurakapalem, Lingamguntla in Nekarikallu mandal. Samples were collected in pre cleaned polythylene bottles 1 litre.

The water samples are analyzed by SPADNS 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 acid 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.

## Result and discussion:

### Nekarikallu Mandal

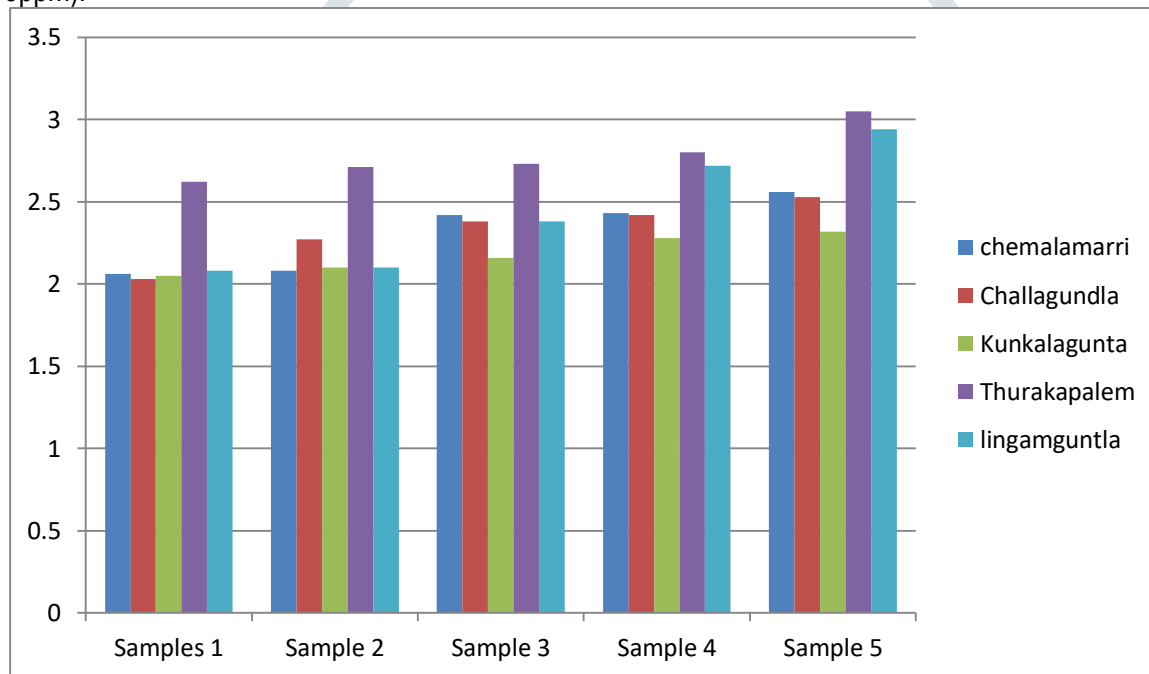
NAME OF VILLAGE AND SOURCE	FLUORIDE CONCENTRATION (mg/L)	Fluoride permissible Level
<b>Chemalamarri (Handpump)</b>	2.06	0.8-1.0 mg/l
S.C colony, Borewell	2.08	0.8-1.0 mg/l
Temple, Openwell	2.42	0.8-1.0 mg/l
School, Handpump	2.43	0.8-1.0 mg/l
Handpump	2.56	0.8-1.0 mg/l
<b>Challagundla (Borewell)</b>	2.03	0.8-1.0 mg/l
M.P.U.P School, Openwell	2.27	0.8-1.0 mg/l
Bus stand Borewell	2.38	0.8-1.0 mg/l
S.W School, Handpump	2.42	0.8-1.0 mg/l
B.C Colony, Borewell	2.53	0.8-1.0 mg/l
<b>Kunkalagunta (Handpump)</b>	2.05	0.8-1.0 mg/l
Venkaya Colony, Borewell	2.10	0.8-1.0 mg/l
Bus stop, Borewell	2.16	0.8-1.0 mg/l
Temple, Borewell	2.28	0.8-1.0 mg/l
Srinivas, Borewell	2.32	0.8-1.0 mg/l
<b>Thurakapalem (Handpump)</b>	2.62	0.8-1.0 mg/l
Handpump	2.71	0.8-1.0 mg/l
Z.P.H.School, Handpump	2.73	0.8-1.0 mg/l

B.C colony, Handpump	2.80	0.8-1.0 mg/l
Hand pump	3.05	0.8-1.0 mg/l
<b>Lingamguntla (Borewell)</b>	2.08	0.8-1.0 mg/l
Borwell	2.10	0.8-1.0 mg/l
Temple, Open wells	2.38	0.8-1.0 mg/l
Borewell	2.72	0.8-1.0 mg/l
Zp School, Borewell	2.94	0.8-1.0 mg/l

**Table: 1 Fluoride Concentration of Nekarikallu mandal in ppm**

A total 25 samples of the fluoride concentration were analyzed and summarized in Table 1. The fluoride concentration ranged from 0.8 to 1.0 mg/l. The highest fluoride levels 3.05 observed at Challagundla and lowest at Chimalamarri and Kunkalagunta. The mean values of Nekarikallu mandal are 2.03.

In the study 25 Samples Out of 25 samples are above than the permissible limit. Especially in Nekarikallu mandal Challagundla and Thurakapalem villages is completely above than the permissible limit(2.94 and 3.05ppm).



**Graphical representation of fluoride concentration in Nekarikallu mandal.**

## Conclusion:

The present status of groundwater in parts of Nekarikallu mandal, Guntur District was assessed in this study. High concentration of fluoride in groundwater of 2.08 to 4.52 mg/l was measured. About 30% of wells had fluoride concentration above the permissible limit of 1.5 mg/l set by fluoride water standard. Moreover, it is also important to note that 18% of groundwater samples were below the prescribed concentration (0.6 mg/l). Thus, out of 25 groundwater samples analyzed during the study, 48% of them had fluoride either above or below the permissible limit. The use of groundwater for drinking purpose from these wells has to be restricted. The rocks of this area possess fluoride content higher than the world average. Weathering of rocks and leaching of fluoride bearing minerals are the major reasons which contribute to elevated concentration of fluoride in groundwater. The other important natural phenomenon that contributes to high fluoride is evaporation. Suitable measures such as defluorinating the groundwater before use and recharging the groundwater by rainwater harvesting need to be practiced to improve the groundwater quality in this area..

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