



## CONCENTRATION OF FLUORIDE IN GROUNDWATER AND ITS DISTRIBUTION BETWEEN COASTAL AND CENTRAL AREAS IN S.P.S.R. NELLORE DISTRICT

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### ABSTRACT

This paper deals with the results of analysis of Fluoride and other water quality parameters of groundwater and its distribution in view of distance from coastal areas towards interior areas. The findings reveal the fact the concentration of Fluoride comes from the coastal area towards the central areas.

**Keywords :** Fluoride, groundwater, coastal, central areas, SPSR Nellore district.

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### INTRODUCTION

Fluoride is an essential element for human and animal health particularly for prevention of dental caries. But high fluoride content in drinking water gives rise to harmful effects in human beings and animals. Fluoride deficiency, on the other hand may have a harmful influence on the growth of teeth<sup>1</sup>. Fluorosis is a kind of disease caused by consuming excessive amounts of fluoride i.e., above 1 ppm fixed by ICMR<sup>2</sup>. However with identical concentrations of fluoride in water, variations in the incidence of the disease<sup>3-4</sup> have been noticed.

Thus, it is related to other chemical constituents<sup>5-11</sup> of drinking water which are protective against the development of Fluorosis such as Magnesium, Calcium and total hardness. After eruption of the teeth, the fluoride content of drinking water has no visible effect on the enamel even though the fluoride content of the teeth increases for analysis, the samples of water were collected from different places are located in SPSR Nellore district<sup>12-13</sup> on the Bay of Bengal and were investigated.

### EXPERIMENTAL

Samples of drinking water from all the available sources of the selected areas were collected in polythene bottles. The total number of water samples collected from all these areas put together was 20. The bore wells in the areas were about 100 – 600 feet in depth. All the samples were analysed for various parameters<sup>14</sup>. Fluoride was analysed by Spectrophotometer. Total alkalinity, total hardness, calcium, magnesium and fluoride were determined by usual titration methods. pH of the water samples was measured by using pH meter. Electrical conductivity of the water samples was measured by using conductivity bridge.

### RESULTS AND DISCUSSION

The concentration of natural fluoride in ground water is not uniform in these areas. The fluorotic variation is due to many factors such as sources of water, the geological formation of the area, the amount of rain fall and the quantity of water lost by evaporation. The parameters e.g., pH, alkalinity, calcium, magnesium and chloride which are enhancing fluoride toxicity<sup>15-20</sup>

Table-1 reports the findings of the concentration of fluoride and other parameters in ground water samples. In the water samples of these areas, pH, ranged from 6.39 to 8.34. The electrical conductance ranged between 511 and 2448 mho/cm. Total hardness and chloride were ranged from 270 to

3600ppm and 32.02 to 2352.08 ppm. The total alkalinity of these samples ranged from 96.21 to 288.63 ppm.

Concentration of fluoride in udayagiri ranged from 3.8 to 4.8 ppm, doravari satram ranged from 3 to 3.9 ppm, atmakur from 3.2 to 3.4 ppm, venkatagiri from 2 to 3 ppm, Gudur from 2ppm, Naidupet from 1.6 to 2ppm and sullurpet from 1.5 to 2ppm. As the distance increases from the coastal areas of udayagiri towards interior parts upto sullurpet, the values of fluoride concentration decreases, this is due to the leaching of fluoride from the rock soil to the ground water. While fluoride toxicity decreases udayagiri to sullurpet, the percentage of people affected by fluorosis is also decreases. The average values of fluoride in water and percentage of people affected by fluorosis are given in table-2.

Table-1: Physico-chemical Parameters in Groundwater Samples

S.N	Description of source	Fluoride (ppm)	pH	EC (mho/cm)	Total Alkalinity (ppm)	Total hardness (ppm)	Calcium (ppm)	Magnesium (ppm)	Chloride (ppm)
I	<b>Sullurpeta Town</b>								
1.	Hand pump water inside the campus of Holly Cross High School	1.5	7.21	1079	267.25	1860	1500	360	1717.49
2.	Bore water from Gokulakrishna College of Engineering	1	7.47	1423	160.35	3420	1900	1520	2352.08
3.	Public hand pump water at RTC bus stand (NH-5)	1.7	7.56	1280	256.56	3600	2800	800	2084.28
4.	Public hand pump water at Govt. Hospital	1.8	7.91	738	181.73	800	550	250	1210.97
5.	Public hand pump water at Southern church (Main Rd)	2	8.01	741	160.35	970	720	250	1251.73
II	<b>Udayagiri</b>								
6.	Hand pump water inside the campus of Govt. High School	3.8	7.83	1080	235.29	270	190	80	43.66
7.	Public hand pump water on the main road side	4.8	6.70	2448	224.59	330	240	90	305.65
8.	Bore water from Sreenivasulu Reddy's house	3.9	6.68	1278	213.90	360	290	70	32.02
III	<b>Doravarisatram</b>								
9.	Bore water from Nellapattu Bird Sanctuary	3.9	6.78	936	235.29	300	240	60	52.39
10.	Bore water on the main road side	2.9	6.39	1546	256.68	550	410	140	419.18
11.	Public hand pump water from Near Fly over	3	7.45	1746	310.16	750	580	170	489.05
IV	<b>Kavali</b>								
12.	Public hand pump water from JB Degree college	3.4	8.43	1494	128.34	380	310	70	40.75
13.	Bore water from Annapurna Hotel (Main road)	3.5	6.79	1026	203.21	330	275	55	34.93
V	<b>Gudur</b>								
14.	Hand pump water at Vegetable Market	2	8.34	680	213.80	450	330	120	139.73
15.	Bore water from Sai Baba Temple	2	7.38	610	267.25	4601	350	110	58.22

VI	<b>Naidupeta</b> Public hand pump water from RTC Bus stand	1.6	7.40	3200	96.1	1510	1380	130	1787.35
16.	Bore water from Pitchi Reddy Thopu	2	8.13	690	310	510	460	50	52.398
VII	<b>Venkatagiri</b> Public hand pump water at Raja Palace	3	7.37	2260	224.49	690	400	290	1082.89
18.	Bore water from VRJC Jr College	3.2	7.5	2870	230	700	410	300	1100
VII	<b>Atmakur</b> Bore water from agriculture field	3.4	6.70	1020	200	310	265	50	35.6
20.									

Table-2: Average Values of Fluoride (ppm) in Water and Percentage of Fluoride

Name of the place	Fluoride(ppm)	%of people affected by fluorosis
Udayagiri	4.20	38.50
Doravarsatram	3.45	31.00
Atmakur	2.95	30.75
Venkatagiri	2.12	26.70
Gudur	2.00	25.00
Naidupet	1.60	Trace
Sullurpet	1.50	Nil

### CONCLUSION

The author found that concentration of fluoride in ground water decreases from 4.8 to 1ppm, on the coastal area of udayagiri upto sullurpet. The percentage of people affected by fluorosis also decreases from udayagiri to sullurpet. In sullurpet none of the people is affected by fluorosis. Therefore, of fluoride in water drawing from deep borewells from the coastal areas to the interior parts influence fluorosis. Hence it is obvious that nature of depthness of borewell is a factor for fluorosis.

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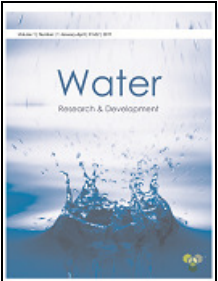
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