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Study on Fluoride Levels in Water of Nalgonda District, Telangana, India

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A B S T R A C T

In the present communication the fluoride level in the drinking water of some selected areas (Once high fluoride areas) of Nalgonda District of Telangana, India were determined. Levels of fluoride in these areas ranged between 0.5 to 3mg/L. Highest level of fluoride was seen in Lenkalapally water sample (3mg/L), while lowest levels were observed in Araygudem, Nalgonda (railway station), Nalgonda (bus stop) and Vattipally (drinking water) (0.5mg/L). The number of samples with 0.5, 1, 1.5, 2, and 3mg/L of fluoride levels were 5, 14, 6, 2 and 1 respectively. These results clearly suggest that defluoridation plants have drastically reduced the fluoride levels in water used for drinking purposes.

Introduction

Water forms the most important component of eco-system any imbalance either in its amount or presence of added impurities to it can harm the whole eco-system (Ranjana, 2009)[1] In India nearly 12 million tons of fluoride gets deposits on the earth's crust. These fluoride deposits are the cause for fluorosis in 17 states of India (UNICEF, 1999)[2]. The most seriously affected areas are Andhra Pradesh, Punjab, Haryana, Rajasthan, Gujarat, Tamil Nadu and Uttar Pradesh (Venkateshwarlu *et al.*, 2014)[3]. High groundwater fluoride concentrations associated with igneous and metamorphic rocks such as granites and gneisses have been reported from India, Pakistan, West Africa, Thailand, China, Sri Lanka and Southern Africa (WHO, 2006). Among the different parameters that are analyzed for determining the quality of water, fluoride ion exhibits unique properties in the sense, its concentration in optimum dose in drinking water is advantageous to health however, if the concentration exceeds the limit, it affects the health (Vekata Mohan, S., 1995)[4]. A higher concentration causes serious health hazards which manifest itself in three forms, namely, dental, skeletal and non-skeletal fluorosis. Therefore, it is desirable to drink water having a fluoride concentration less than certain value (Fluoride in Drinking Water,

2006)[5]. The WHO guideline for fluoride is 1.5 mg/L (W.H.O., 1995))[6], which is the same as EEC guideline (EEC., 1998)[7], U.S. EPA, also it had determined maximum concentration 4 mg/L to prevent bone fluorosis [6]. The aim of this study is to determine the concentration of fluoride in the vicinity areas of Nalgonda and compare it with the permissible limit.

Materials and Methods

A standard fluoride testing kit manufactured by Nice Chemicals Pvt Ltd**,** Cochin, Kerala, India was used to determine the fluoride levels. The method is based on colour comparison and it is generally practised in the government RWD lab units for estimation of the fluoride content in rural villages of Nalgonda (M. Alagar Raja, M. *et al.*, 2013)[8]. Water samples (bore water, drinking water, ground water, tap water and sagar water) were collected from different areas in Nalgonda District (Telangana, India). These areas were selected since the fluoride contents in these areas used to be very high earlier. The collecting bottles were thoroughly cleaned by rinsing with 8M HNO_3 followed by several washes with double distilled water.

Results and Discussion

A total of 28 water samples were collected from different areas of Nalgonda District. All the water samples were tested in duplicates and results are summarized in table 1. It was observed that the fluoride content in these samples ranged between 0.5mg to 3mg/L. The study area are categories into different groups based upon the fluoride levels (group I- 0.5mg/L, II- 1.0mg/L, III- 1.5 mg/L, IV- 2 mg/L and V- 3mg/L) (Table 2). The number of water samples with 0.5, 1, 2, 3 and 5mg/L of fluoride levels were 4, 13, 1, 2 and 1 respectively. A representative photograph of the different fluoride levels along with negative and positive controls are shown in figures 1 & 2.

Figure.1 Fluoride Levels in Drinking Water Samples

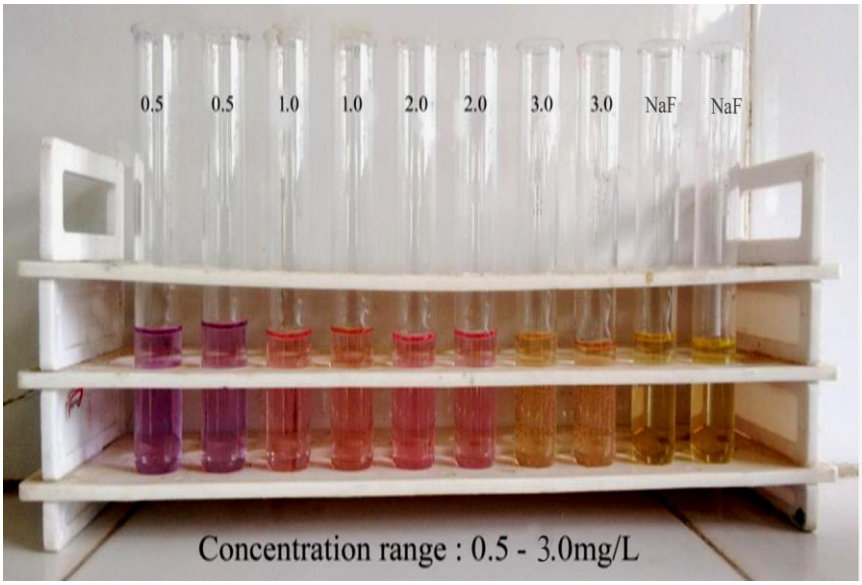


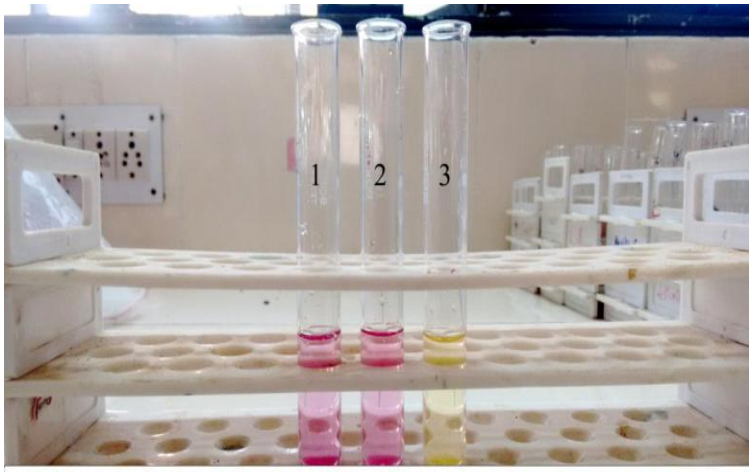
Table.1 Fluoride Concentration in Water Samples

S. No	Name of the villages	F^- (mg/L)				
		0.5	**1.0**	**1.5**	**2.0**	**3.0**
1.	Choutuppal				2.0	
2.	Kamagudam- chandur mandal		1.0			
3.	Mallapur – Choutuppal		1.0			
4.	Araygudem	0.5				
5.	Lingojigudem		1.0			
6.	Darmojigudem-Choutuppal		1.0			
7.	Urumudla		1.0			
8.	Marriguda mandal		1.0			
9.	Shivannagudem				2.0	
10.	Munugodu (plantation water)		1.0			
11.	Munugodu (drinking water)		1.0			
12.	Nalgonda (railway station)	0.5				
13.	Nalgonda (bus stop)	0.5				
14.	Gudapur		1.0			
15.	Munugodu (ground water)			1.5		
16.	Munugodu (tap water)		1.0			
17.	Munugodu (bore water)		1.0			
18.	Lenkalapally					3.0
19.	Vattipally		1.0			
20.	Vattipally (drinking water)	0.5				
21.	Vattipally (sagar water)		1.0			
22.	Shivannagudem	0.5				
23.	Batlapally			1.5		
24.	Lingotam (tap water)			1.5		
25.	Marrigudem (bore water)			1.5		
26.	Mal			1.5		
27.	Marrigudem (tap water)		1.0			
28.	Lingotam (bore water)			1.5		
Number of samples that tested positive		**5**	**14**	**6**	**2**	**1**

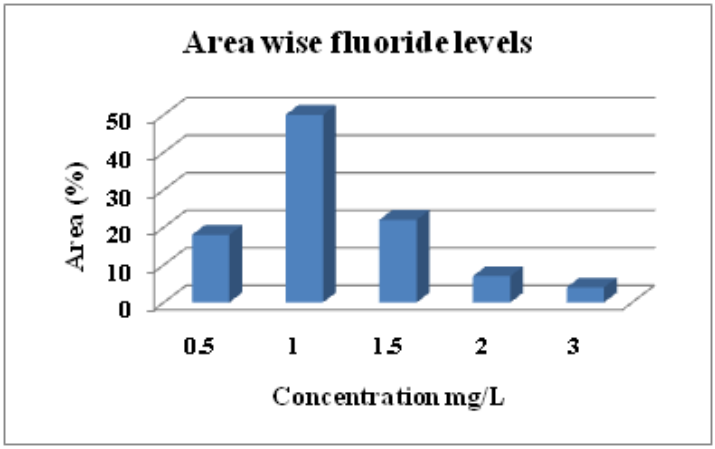
Table.2 Classification of Areas based on Fluoride Levels

Group	I (0.5mg/L)	II (1mg/L)	III (1.5 mg/L)	IV (2mg/L)	V (3mg/L)
	5	14	6	2	1
%	18	50	22	7	4

Figure.2 Controls-Doubled Distilled Water; Tap Water and Sodium Fluoride



1. Double distilled Water 2.Tap Water 3. NaF (positive control)



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