



FLUORIDE IN GROUNDWATER OF NEEMKATHANA BLOCK SIKAR, (RAJASTHAN) INDIA

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Abstract: This paper observes, comparative analyses and describes the groundwater fluoride level of Neemkathana Block. Seven villages (Ganeshwar, Khadra, Mandoli, Sirohi, Chala, Heeranagar, and Bhudoli) have been selected for sampling for groundwater testing and monitoring. The sampling method is selected as per BIS and WHO. The variation of fluoride in water of all seven sampling villages is shown in table and figure. Fluorides average value varying between 0.4 to 2.5 mg/L. BIS (IS10500:2012) have a relaxation limit up to 1.5 mg/L. Groundwater samples of Chala and Heeranagar have average exceeds the permissible limit of 1.5 mg/L. The higher fluoride in water affects the human health.

Keywords: Groundwater, physio-chemical parameters, Fluoride, BIS, permissible limit, WHO

I. Introduction

The main source of fluoride in rock is Quartzites, basalts, hornblende, biotite, fluorapatite, fluromica, cryolite delorites, etc (McGown,1977). The inorganic chemicals holds the greater portion of contaminants of drinking water in comparison to the organic chemicals (Rahmanian et al., 2015). To show the effect of groundwater fluoride on dental fluorosis selected duration of 2007-2017 from web sources and stated by their review that below 11 year age are more affected, Meta-regression analysis indicates temperature and groundwater fluoride both have influence on dental fluorosis and also stated that impact on health is more in less developed countries (Akuno,2019). The thyroid gland in the body seems to be more sensitive to F⁻ (Shashi, 1988). Fluoride increases the amount of thyroid-stimulating hormone (TSH) and decreases the amount of T3 and T4 hormones resulting in producing hypothyroidism (McLaren, 1976). Insulin resistance in humans is caused by chronic fluoride exposure from drinking water (Trivedi, et. al, 1993). Dental fluorosis is hypomineralization of tooth enamel caused by intake of too much fluoride during enamel formation (Wong, et.al, 2010). Children more than ten year are more affected by dental fluorosis and permanent teeth have impact rather than primary (Shitumbanuma, 2007). Millions of people exposing excessive fluoride due to which facing the problem of milder dental conditions and crippling skeletal (United Nations, 2006). To protect teeth from decay for children fluoride supplements are required if drinking water have less than the optimum level of fluoride (ASTDD,2013). The enamel breakdown is caused by acid produced by bacteria and fluoride protects teeth from decay (Anzilotti, 2021). 0.7 mg/L an optimum level for fluoride recommended by The U.S. Public Health Service (USPHS) for protecting teeth from decay. The American Dental Association (ADA) says that the fluoride in water is beneficial to the communities because it: reduces dental decay up to 20 to 40 percent. The most common problem occurred due to high fluoride in water is tooth decay, however fluoride is origin of problems of bones, and neurological development in human being. Due to high fluoride the bones may become hardened and less elastic which increases the risk of fractures. The Fluoride is the important cause of damage the parathyroid gland, this called the thyroid problem. The other problem which are generated due to high fluoride are : acne and other skin problem, cardio vascular

problem, reproductive tissues like lower fertility, osteoarthritis, bone cancer, temporomandibular joint disorder and neurological problems possibility leading to ADHD [78]. According to the International Association of Oral Medicine and Toxicology (IAOMT), an organization that campaigns against the use of added fluoride, it may also contribute to the following health problems: Excess exposure of fluoride may result into a bone disease termed as skeletal fluorosis. Skeletal fluorosis leads the bones to be hardened so increasing the risk of fractures. For the preventing tooth decay Department of Health and Human Services (DHHS) sets the optimal level of fluoride for at 0.7 milligrams (mg) in every litre of water. The Environmental Protection Agency (EPA) sets the maximum level at 4 ppm. Data from 2000-2008 of the New Zealand Cancer Registry shows no evidence of association of osteosarcoma and fluoride. No evidence regarding water fluoridation in New Zealand affects neurological development, for prevention tooth from decay – 1 mg/L and lead to increased bone strength, while decrease bone strength when present upto 4 mg/L.

II. Material and Methods

Estimation of parameter is done with the help of UV Spectrophotometric method by the use of water samples as material from the sources which are hand pumps, and bore wells. A 1 litre water bottle are used for the sampling, the sample test started from august 2020 to July 2021.

III. Study Area

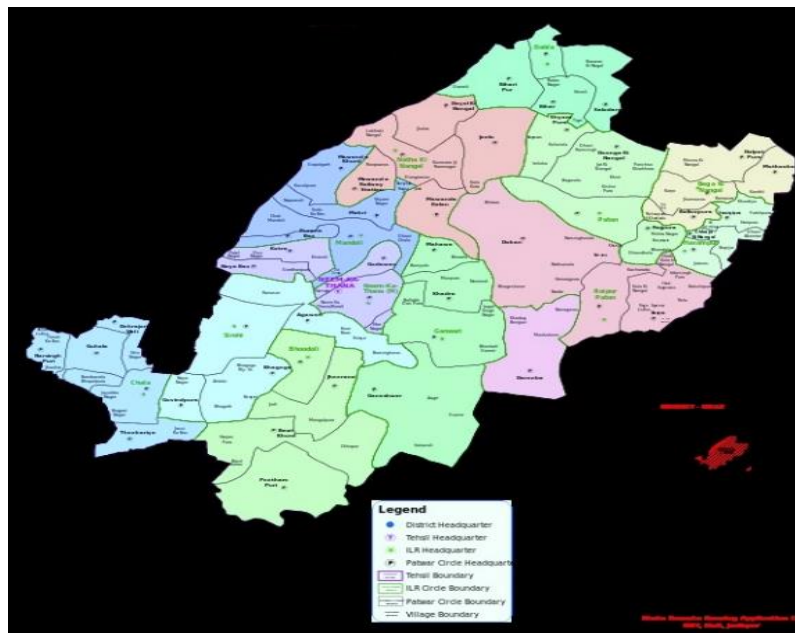


Figure 1: Neemkathana block (source: election commission)

3.1 Geographic Location

The latitude of Neemkathana, Rajasthan, India is 27.738001, and the longitude is 75.782997. Neemkathana, Rajasthan, India is located at *India* country in the *Towns* place category with the gps coordinates of 27° 44' 16.8036" N and 75° 46' 58.7892" E. Total area of tehsil is 1,178 km² including 1,153.79 km² rural area and 24.56 km² urban area and total population of 82198 peoples with household 69,151 (census2011). The mean annual rainfall is highest (536.6 mm) at block and hydrological Older formation alluvium and quartzite. The principal aquifer in the area is Quaternary sediments. Due to unavailability of surface water peoples are dependent on groundwater.

IV. Result and Data Analysis

Assessment of Fluoride in groundwater of Neemkathana block

The results of fluoride in groundwater of Neemkathana Block is shown in the Table

Table 2 : Fluoride in groundwater of Neemkathana block

Village Month	Ganeshwar	Khadra	Mandoli	Sirohi	Chala	Heeranagar	Bhudoli	Mini	Max
Aug-20	0.52	1.06	0.75	0.95	0.91	2.01	0.91	0.52	2.01
Sep-20	0.71	1.0	0.7	0.9	0.61	1.85	0.71	0.61	1.85
Oct-20	0.39	0.88	0.63	0.54	2.49	0.84	0.17	0.17	2.49
Nov-20	0.52	1.17	0.91	0.8	2.81	2.02	0.82	0.52	2.81
Dec-20	0.53	0.9	0.72	0.85	2.4	1.8	0.8	0.53	2.4
Jan-21	0.5	0.95	0.7	0.83	2.6	1.74	1.0	0.5	2.6
Feb-21	0.43	1.2	0.86	0.96	2.79	1.94	0.9	0.43	2.79
Mar-21	0.48	1.0	0.72	0.92	3.2	1.93	0.78	0.48	3.2
Apr-21	0.53	1.05	0.79	0.95	2.97	0.83	0.83	0.53	2.97
May-21	0.55	1.08	0.82	0.98	3.07	1.88	0.85	0.55	3.07
Jun-21	0.46	1.03	0.79	0.88	1.98	0.85	0.79	0.46	1.98
Jul-21	0.56	1.02	0.79	0.98	2.79	1.98	0.86	0.56	2.79

Figure 1: Fluoride in groundwater in Neemkathana block

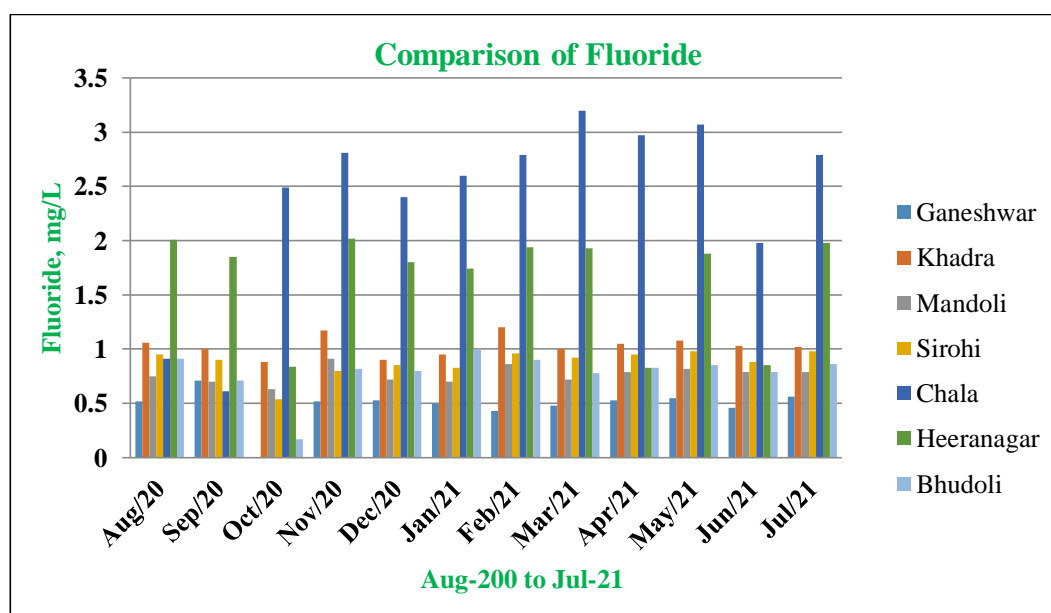


Table and figure shows the data of the assessment period from Aug-20 to Jul-21 for Fluoride in groundwater of Neemkathana block. The BIS (IS10500:2012) standards acceptable limit of 1 mg/L is shown in groundwater of Ganeshwar, Mandoli, Sirohi, and Bhudoli villages, while remaining three village, Khadra, Heeranagar, and Chala shows a trend in which limit exceeded the acceptable limit. Fluoride in groundwater of Chala village is relatively higher.

V. Conclusions and Suggestions

The data analysis was done after that and found many up and down of contaminations/incidents in these villages. The Fluoride is found higher in the various villages that's why the physical problems related to higher fluoride is observed in these villages. It is suggested that these villages are required the filtration system and this report will be give a direction to select particular type of filter used in the particular area of Neemkathana. It may also helpful to be a part of Jal Jeevan Mission of Government of India.

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