

Study of Fluoride and its Removal in Ground Water in Dausa Tehsil

Abstract

Rajasthan is the driest State in India. The state depends on ground water in 91% for both drinking & irrigation. In this research paper on the basis of the report of chemical examination of ground water of the study area Dausa tehsil, it is aimed to reveal the imbalance of fluoride contamination in ground water in Dausa tehsil. It is found that 08 samples out of 24 samples cross the limit of acceptable fluoride contamination according to BIS. In the present research work it is found that neem stem charcoal has been a best way for the removal of fluoride from ground and surface water in Dausa Tehsil.

Keywords: Fluoride, Neem Stem Charcoal, Distilled Water, Borosilglasswares, Naphthalene Disulphonate.

Introduction

Rajasthan is the driest state in India in which out of 15 basins only two rivers basins are perennial i.e. Chambal & Mahi. Due to the unavailability of surface water, ground water plays an important role not only for drinking water but also for irrigation. Rajasthan has only 1% of country's water resource. The state has extreme geographical & climatic conditions. The state comprises most of wide and inhospitable Thar Desert on 60% of its total area this is why the state dependence on ground water is 91% for both drinking and irrigation. Unfortunately, this precious source is facing the problem of salinity, fluoride, high nitrate contamination in most of the districts of Rajasthan.

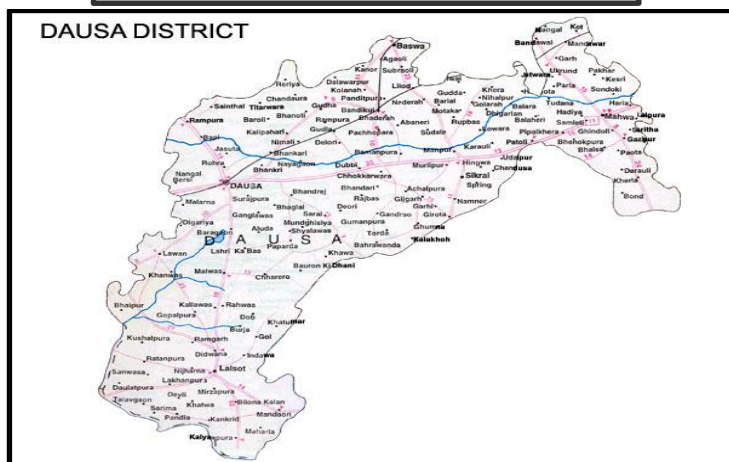
Study Area: -

The study area Dausa region is a tehsil of Dausa district in the State of Rajasthan.



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The study area Dausa is situated in the eastern part of the state. It is also known as "Dev Nagari". Dausa is located between 26° 22' N to 27° 14' N and 76° 8'E to 77° 4' E longitude. Dausa district has a population of 1634409 according to census 2011, and area of 3432 square kilometer. Dausa Tehsil is bounded in the north by Baswa tehsil in the east by Mahwa tehsil in the south by Lalsot tehsil and in the west by Bassi tehsil of Jaipur district.

Objective of the Study

1. The present research work aims to seek the fluoride contamination in ground water in the Dausa region.
2. To removal the imbalance of fluoride in ground water of the study area.
3. To find out the possible reseasonsof high fluoride concentration and its treatment.

Experimental

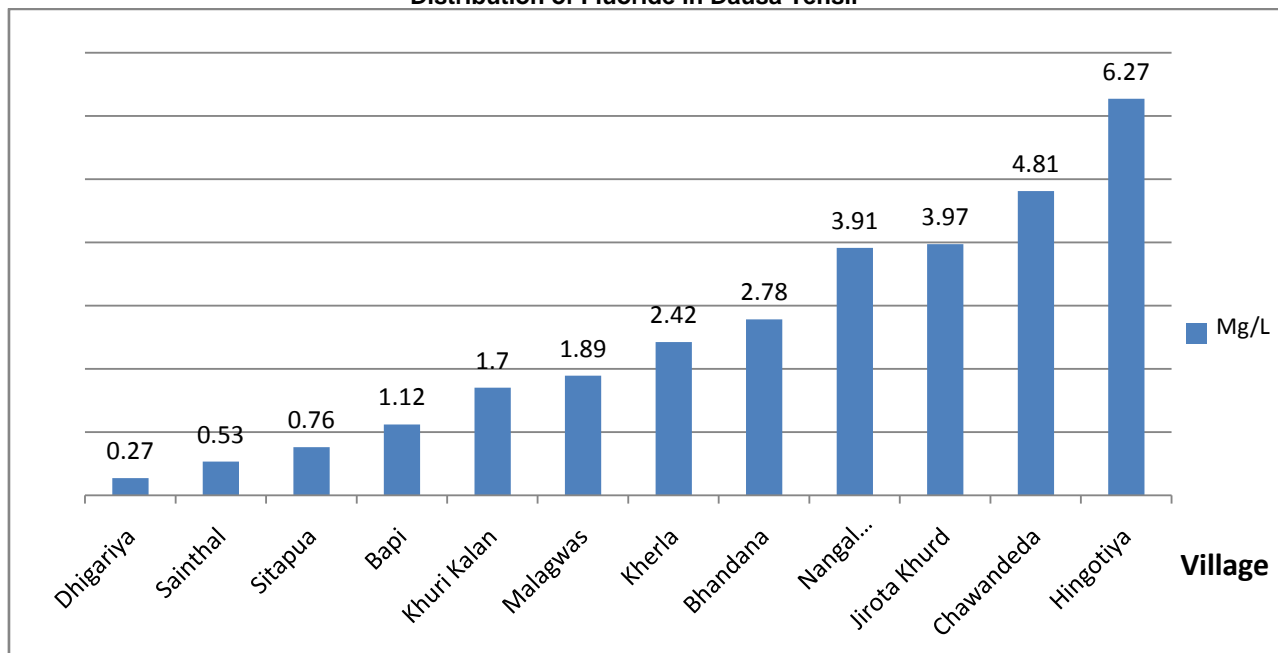
The study was carried out in twelve villages of Dausa Tehsil because the people of this region use

ground water for drinking and also for irrigation fields. The ground water samples were collected from handpumps, bore wells and open wells during the study year 2018 from twenty four different sampling stations of villages Dhigariya, NagalGovind, Sitapura, Chawndeda, Malgawas, Khuri Kalan, Bapi and Saithal. Two sample from each village from defferent places were colleted in clean poly ethylene plastic bottles of 200ml capacity and before filling, bottles were rinsed with water under study. They were labeled and brought to the laboratory for fluoride determination on the same day. Water sample were analysed by using the sodium - 2 parasulphophenylazo-1-8- dihydroxy-3, naphthalene disulphonate (SPADNS) Spectrophotometric method. The AR-grade reagent and chemicals, distilled water and Borosilglasswares were used throughout the work.

Distribution of fluoride in Dausa Tehsil

S.No	Name of Village	No. of Sample	Average Con. of Fluoride in mg/L	
1	Dhigariya	02	(.26+.28)/2	=.27
2	NangalGovind	02	(3.91+3.91)/2	=3.91
3	Hingotiya	02	(8.76+3.91)/2	=6.27
4	Kherla	02	(1.31+3.53)/2	=2.42
5	JirotaKhurd	02	(1.79+6.15)/2	=3.97
6	Bhandana	2	(3.3+2.27)/2	=2.78
7	Sitapura	02	(1.08+.45)/2	=.76
8	Chawandeda	02	(1.37+8.26)/2	=4.81
9	Malagwas	02	(2+1.79)/2	=1.89
10	Khuri Kalan	02	(1.71+1.7)/2	=1.70
11	Bapi	02	(.63+1.61)/2	=1.12
12	Sainthal	02	(.47+.59)/2	=0.53

Distribution of Fluoride in Dausa Tehsil



Removal of Fluoride from Ground Water

Analysis of water quality of Dausa region and the prevalence of the bones in children as well as in adults, weaking of joints and knees in adults, teeth

molting in inhabitants. For the removal of fluoride from the surface and ground water of Dausa region to be used for domestic purposes, neem stem charcoal in its fine powder form has been investigated as and

affordable means. It has been found that neem stem charcoal significantly removes the fluoride from the ground water and surface water of the Dausa region. In the investigation it has been found that it works off efficiently in the PH range of surface and ground water of Dausa region.

The easiest way of regeneration of neem stem charcoal has been investigation the optimum condition for the removal of fluoride from the surface and ground water of Dausa region has been determined.

Best results was obtained when 10L water (average daily family consumption for drinking) was passed through the column of transparent PVC of dia. 6.36 inches and length of 50 inches. Column was packed with sand of length 04 inches, neem stem charcoal of length 08 inches and sand of length 02 inches respectively. Output flowrate of water was maintained to 100 ml minute such that 10 mL water may be purified by 02 hour. Result for the removal of fluorideion have been presented in the table. Flourideion concentration in water sample before and after passing through neem stream charcoal.

S.No	Sample	Ci	Cf
1	NangalGovind	3.91	.90
2	Hingotiya	6.27	.92
3	Kherla	2.42	.90
4	JirotaKhurd	3.97	.92
5	Bhandana	2.78	.90
6	Chawandeda	4.81	.95
7	Malgawas	1.89	.82
8	Khurikalan	1.70	.80

Ci (Mg/L) Initial Concentration

Cf (Mg/L) Final Concentration

Conclusion

In this region probable source of fluoride in ground water is due to weathering and circulation of water in rocks and soils. Fluoride is leached out and dissolved in ground water. According to world Health Organization WHO 1994 and Indian Standard Drinking waterspecificationISI 1991 the maximum permissible limit of fluoride in drinking water is 1.5 mg/L and highest desirable limit is 1.0 mg/L. Fluoride concentration above 1.5 mg/L in drinking water cause fluorosis. It was found that among these eight location, ground water of villages are under serious fluoride contamination where fluoride concentration is most of months was exceeding the permissible limit. After evaluating the data of study, it is concluded that the ground water of Dausa Region is polluted with excess amount of fluoride and can result in dental and skeletal fluorosis. To reduce the adverse effects removal of excess fluoride by Defluoridationtechniques from drinking ground water of Dausa Region but it has been found from the

survey that this technology is not affordable to the rural under privileged community. Neem stem charcoal found very effective to remove the fluorideion from the surface and ground water of Dausa region. Technology has been found very affordable and the transfer of technology to the grass root level may be easy.

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