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Data Article

Data on fluoride concentration profile in groundwater of rural habitats in Mahabubnagar district, Telangana, India

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ABSTRACT

Fluoride is an undesirable chemical in drinking water that can have dreadful concerns on health. The objective of this study is to establish the concentration profile of fluoride in groundwater used as drinking water in 31 rural habitats in Mahabubnagar district, Telangana State, India. Drinking water samples from bore wells/hand pumps were collected from different locations in the study area and analyzed for fluoride levels using a spectrophotometer. The fluoride levels range from 0.6 to 1.8 mg/L, with an average value of 1.31 mg/L. Overall, 32% of groundwater samples found to be exceeded the prescribed limits of fluoride in the study area, as prescribed by the World Health Organization (WHO). Besides, the optimal amounts of fluoride in drinking water have to meet in the range of 0.5 mg/L and 1.5 mg/L, as this range is the permissible limit for drinking. Fluoride is an essential micronutrient for normal mineralization of teeth and bones as well as for the formation of dental enamel in the human body. This study suggested that prolonged intake of drinking water with fluoride concentrations higher than acceptable limits can trigger dental and skeletal fluorosis in the general community of the study region. The fluoride data compared

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with the permissible levels recommended for drinking purposes by various regulatory agencies across the world.

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Specifications Table

Subject	Environmental Sciences
Specific subject area	Water Chemistry
Type of data	Table Figure
How data were acquired	Groundwater samples were collected in prewashed polypropylene bottles with distilled water, and subsequently with water samples to be collected. Physicochemical parameters like pH, EC, and TDS were measured using pre-calibrated pH meter(Hanna instruments), EC, TDS (Hanna instruments). Fluoride concentrations were measured by using a spectrophotometer (SmartSpec plus Spectrophotometer, Bio-Rad, USA). All the above measurements were carried out by standard methods described in APHA (2005).
Data format	Raw data
Parameters for data collection	Physicochemical parameters such as pH, EC, TDS, and fluoride concentration in groundwater samples were obtained as described above.
Description of data collection	Thirty-one (31) Rural habitats around Mahabubnagar selected for the study. Drinking water samples were collected, transported to the research lab, and stored in a dark place at room temperature before proceeding for the fluoride analysis.
Data source location	Mahabubnagar district of Telangana State Latitude: 16° 31' 00"- 16° 53' 00" N and Longitude: 77° 51' 30"- 78° 08' 00" E Country: India
Data accessibility	Data included in this article.

1. Value of the data

- Fluoride in drinking water does not change its color, smell, or taste; hence its measured data has a vital role in protecting human health.
- Monitoring of the drinking water supply for fluoride concentration is critical to prevent adverse health effects such as dental and skeletal fluorosis among residents of endemic areas of fluoride.
- The data collection is beneficial for public health professionals, geologists, geochemists, water supply authorities, hydrologists, environmentalists, researchers, scientists, policymakers, and administrators to execute their relevant works.
- Water quality data concerning fluoride would be useful to develop environmentally-friendly, economically feasible remedial methods to protect public health issues from fluorosis.

2. Data

Thirty-one (31) groundwater samples used for drinking purposes were collected from rural habitats in and around Mahabubnagar town, as shown in Fig 1. The concentration of fluoride in drinking water is ranging from 0.6 to 1.8 mg/L, with a mean value of 1.3 mg/L (Table 1). Fluoride

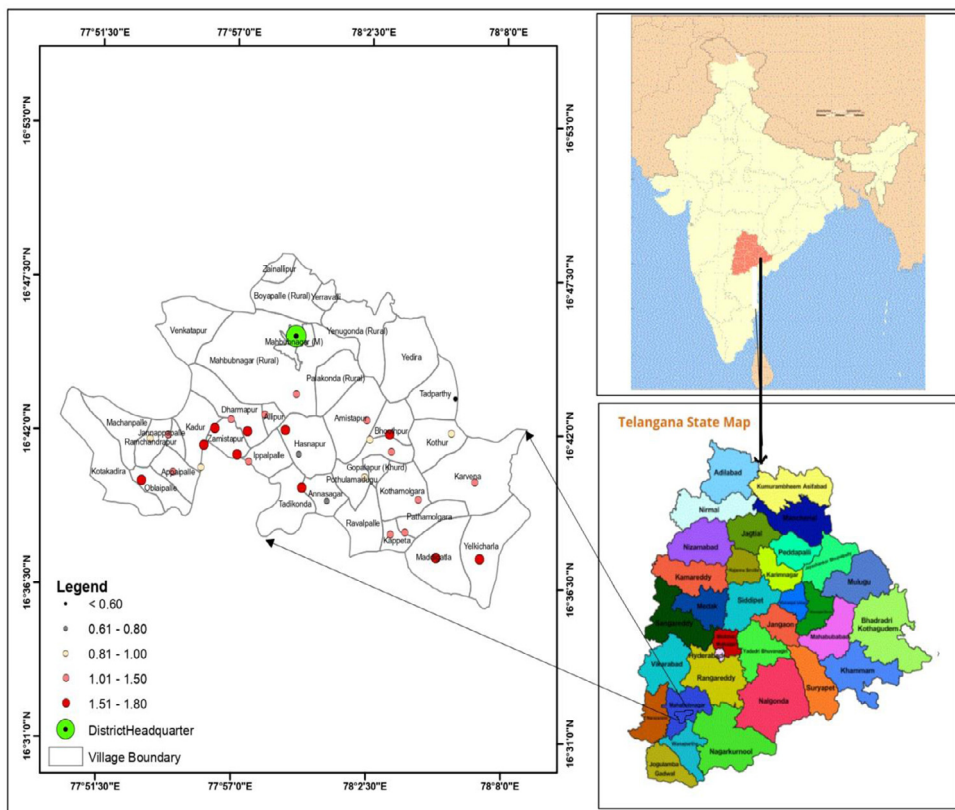


Fig. 1. Location map of the study area and distribution pattern of fluoride concentration in the study region.

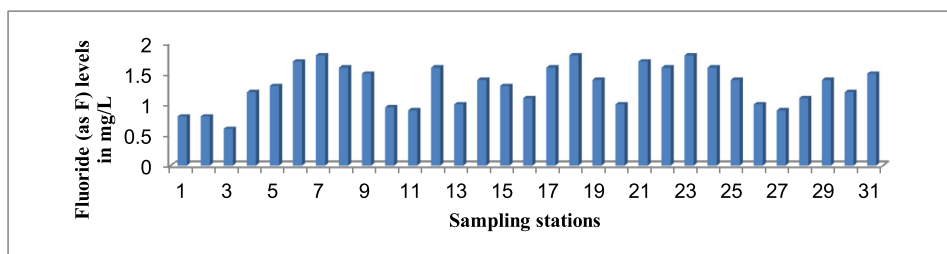


Fig. 2. Fluoride concentration profiling with sampling stations.

profile with sampling stations is shown in Fig 2, and its relationship with pH, EC, and TDS is shown in Fig. 3. The raw data file has been present in the supplementary data set.

3. Experimental design, materials and methods

3.1. Study area

The name, Palamooru is also known as Mahbubnagar. The town even got Rukmammapeta, an older name. Pillalamarri, a giant banyan tree, district emblem. It is the southern district of the

Table 1
Drinking water sample locations and its fluoride levels in study area.

S. No.	Name of the Habitat	Type of well	Coordinates		pH	EC in μ S/cm	TDSin mg/L	Fluoride (as F) in mg/L
			Latitude	Longitude				
1	Hasnapur	Borewell	16° 41' 13.571"	77° 59' 37.862"	8.16	2550	1884	0.80
2	Annasagar	Handpump	16° 39' 33.995"	78° 0' 48.779"	7.50	2480	1833	0.80
3	Thadiparthi	Handpump	16° 43' 17.223"	78° 6' 0.433"	7.13	2930	2170	0.60
4	Kothamolgara	Handpump	16° 39' 38.966"	78° 4' 31.281"	7.58	2050	1535	1.20
5	Pathamolgara	Borewell	16° 38' 29.217"	78° 4' 0.000"	7.53	1021	757	1.30
6	Bhoothpur	Handpump	16° 41' 58.375"	78° 3' 19.401"	7.30	2230	1648	1.70
7	Madigatla	Handpump	16° 37' 34.793"	78° 5' 16.297"	8.07	1252	943	1.80
8	Yelkicharla	Handpump	16° 37' 34.415"	78° 7' 3.990"	7.94	1157	874	1.60
9	Amisthapur	Handpump	16° 42' 28.066"	78° 2' 24.360"	8.11	1737	1287	1.50
10	Kothur	Handpump	16° 42' 2.688"	78° 5' 51.370"	8.02	308	228	0.95
11	Sidhaipally	Handpump	16° 41' 47.637"	78° 2' 31.254"	8.11	1282	950	0.90
12	Tadikonda	Handpump	16° 40' 2.443"	77° 59' 46.954"	7.24	3010	2200	1.60
13	Pothulamadugu	Handpump	16° 40' 26.687"	78° 2' 20.598"	7.80	1876	1388	1.00
14	Gopannapally	Handpump	16° 41' 21.976"	78° 3' 25.471"	8.17	465	344	1.40
15	Karvena	Handpump	16° 40' 18.043"	78° 6' 50.174"	7.45	2390	1783	1.30
16	Kappeta	Handpump	16° 38' 25.034"	78° 3' 24.346"	7.74	1089	806	1.10
17	Oblayipalli Thanda	Handpump	16° 40' 12.681"	77° 53' 14.439"	7.78	1515	802	1.60
18	R Gudem	Handpump	16° 41' 31.329"	77° 55' 45.283"	8.12	1802	955	1.80
19	R C puram	Handpump	16° 41' 52.052"	77° 54' 17.391"	7.90	709	375	1.40
20	Kodur	Handpump	16° 40' 42.343"	77° 55' 38.552"	7.86	1775	937	1.00
21	Alipur	Handpump	16° 42' 5.132"	77° 59' 4.410"	8.10	2760	1462	1.70
22	Bokkalonipalli	Handpump	16° 42' 7.446"	77° 56' 11.183"	7.90	1644	871	1.60
23	Zamisthapur	Handpump	16° 41' 11.505"	77° 57' 6.307"	8.00	1641	869	1.80
24	Dharmapur	Borewell	16° 42' 1.080"	77° 57' 32.014"	7.34	1574	854	1.60
25	Bandameedipalli	Borewell	16° 43' 22.874"	77° 59' 30.391"	7.80	1834	967	1.40
26	Machen palli	Borewell	16° 41' 42.246"	77° 53' 34.379"	7.30	2710	1436	1.00
27	Nehrur Nagar	Borewell	16° 41' 48.412"	77° 58' 23.190"	7.50	612	324	0.90
28	Appayipalli	Handpump	16° 40' 31.508"	77° 54' 30.409"	7.90	1788	947	1.10
29	Chowderpalli	Borewell	16° 42' 26.837"	77° 56' 51.503"	7.30	1216	644	1.40
30	Telugu gudem	Borewell	16° 40' 56.825"	77° 57' 36.135"	7.62	1412	748	1.20
31	Narsapur	Borewell	16° 42' 37.563"	77° 58' 13.872"	7.43	1180	625	1.50
				Min	7.13	308	228	0.60
				Max	8.17	3010	2200	1.80
				Mean	7.73	1677	1079	1.3
				Standard deviation	0.31895	723.1	533.735	0.34253

Table 2
Drinking water standards for fluoride of various organizations in different countries.

Drinking water quality standards	Acceptable limit of Fluoride as F ⁻ (mg/L)
BIS	1.0–1.5
ICMR	1.0
WHO	0.5–1.5
UK	0.3–0.7
USA	0.7–1.2

state of Hyderabad below Nizam, bordered in the south by the river Krishna and surrounded by Nalgonda, Hyderabad, Kurnool, Raichur, and Gulbarga districts [1]. The town of Mahabubnagar is situated 96 km from Hyderabad on national highway 167, it lies between 77.98 ° E at 16.75 ° N and falling in topographical sheet numbers 56 H13, 14 and 56L1, 2 with an average elevation of 498 m.

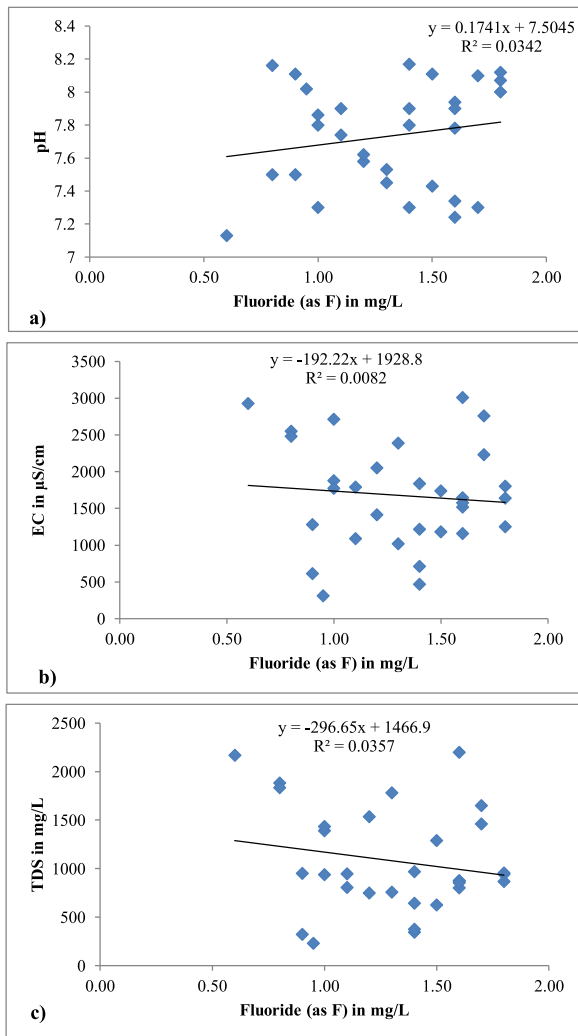


Fig. 3. Correlation between (a) pH and Fluoride, (b) EC and Fluoride, and (c) TDS and Fluoride in the groundwater of the study region.

3.2. Sample collection and analytical method

Drinking water samples were collected from 31 rural habitats during January-February 2020 in prewashed polyethylene bottles, and labeled with a description of the sampling such as habitat and date. Then, samples were transported to the research laboratory, Department of Microbiology, Palamuru University, Mahabubnagar, and stored in a dark place at room temperature before the analysis was carried out [2]. pH, EC, and TDS were measured with pre-calibrated instruments as per APHA standard methods. The concentrations of fluoride ions in drinking water samples were determined using the SPADNS method. The SPADNS method is based on the reaction of fluoride ions and a red zirconium-dye solution. Fluoride reacts with the dye solution, dissociating a portion of it to form a colourless complex anion (ZrF_6^-) and the dye. Thus, bleaching the red color progressively in an amount proportional to the flu-

oride concentration. The decrease in color due to the zirconium-SPADNS reaction was measured at 580 nm using Spectrophotometer (SmartSpec Plus Spectrophotometer, Bio-Rad, USA) [APHA, 2017] [3].

4. Ethics statement

This study does not use experiment on human or an animal.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships, which have or could be perceived to have influenced the work reported in this article.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.dib.2020.106165](https://doi.org/10.1016/j.dib.2020.106165).

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