

STUDIES ON DRINKING WATER QUALITY OF SOME SOURCES OF MASOODA TEHSIL OF DISTRICT AJMER, RAJASTHAN

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ABSTRACT

Ajmer district is an oasis wrapped in the green hills. Today, this district is a popular pilgrimage center for the Hindus as well as Muslims. Out of nine tehsils Masooda is the south east tehsil of Ajmer district. Masooda tehsil has limited pool of surface water due to scanty rainfall averaging fifty cm. per annum. It is fluorosis affected Tehsil of Ajmer district in the state of Rajasthan. A comparative study has been carried out to explore the water quality index of ground water of various sources of Ajmer district. Ten water samples from tube wells, open wells and step wells were collected and analyzed for pH, Chloride, Nitrate, Total Dissolve Solid, and Fluoride. From the study it is clear that the quality of the ground water in the rural area is deteriorating due to existing rocks, chemical fertilizers, Aravalli regions and water table depletion in ground. Geographically a ground strip in the base of Aravallis Mountain series which is expanded from PanchMahal of Gujrat to Gurgoan of Haryana and passes through south east of Rajasthan is the main source of deterioration. In this study overall water quality of these villages are very poor and unsuitable for drinking purpose. The finding of this study along with suitable remedies will be able to aware people against this problem. Present study recommends top priority should be given to water quality monitoring and indigenous technologies should be adopted to make water fit for drinking after treatment such as defluoridation, desalination.

KEY WORDS – Fluorosis, Desalination, Aravali series, Activated alumina

INTRODUCTION

Water is an outstanding solvent. Water as a solvent possesses the capability to dissolve nearly all natural compounds hence called universal solvent. Natural water always contains dissolved matter. The public has been more exacting in its demands as time has passed, and today water engineers are expected to produced finished waters that are free of Color, Turbidity, Taste, Odor and harmful metal ions. Pure water means water which is collected from a properly protected sources and subjected to an adequate system of purification, free from visible suspended matter, Color, Odor and taste devoid of an objectionable bacteria indicative of the presence of disease producing organisms and contain no dissolved matter of mineral or organic origin which in quality would render it dangerous to health and will not dissolve substances injurious to health. Water fit for human consumption is called

drinking water or "potable water". In this study overall water quality of these villages are very poor and unsuitable for drinking purpose. The finding of this study along with suitable remedies will be able to aware people against this problem.

FLUOROSIS⁵

SKELETAL FLUOROSIS – Skeletal Fluorosis is a bone disease. Skeletal fluorosis is not easily recognizable until the disease has developed to an advanced stage. Maximum ill effects of fluoride are detected in the neck, spine, knee, pelvic and shoulder joints. Fluoride also affects small joints of the hands and feet. In this disease fluoride replaces hydroxides in bones causing chronic effects.

Dental Fluorosis⁴ – Dental fluorosis is an irreversible condition caused by excessive ingestion of fluoride during tooth forming years. Common dental diseases are

- (i) Dental caries or decay (ii) Pyorrhoea (iii) Dental fluorosis

NON SKELETAL FLUOROSIS –

The conventional belief that fluoride affects only bone and tooth, has been negated in recent years as the evidences on the involvement of the soft tissues / organ of the body are convincing.

- (i) Erythrocytes (ii) Gastrointestinal mucosa (iii) Ligaments

STUDY AREA –

The district is covering geographical area of 8,481 sq km, situated between 25° 38' & 26° 58' North latitude and 73° 54' & 75° 22' East longitude. Out of nine tehsils Masooda is the south east tehsil of Ajmer district. Masooda tehsil has limited pool of surface water due to scanty rainfall averaging fifty cm. per annum. It is fluorosis affected Tehsil of Ajmer district in the state of Rajasthan.

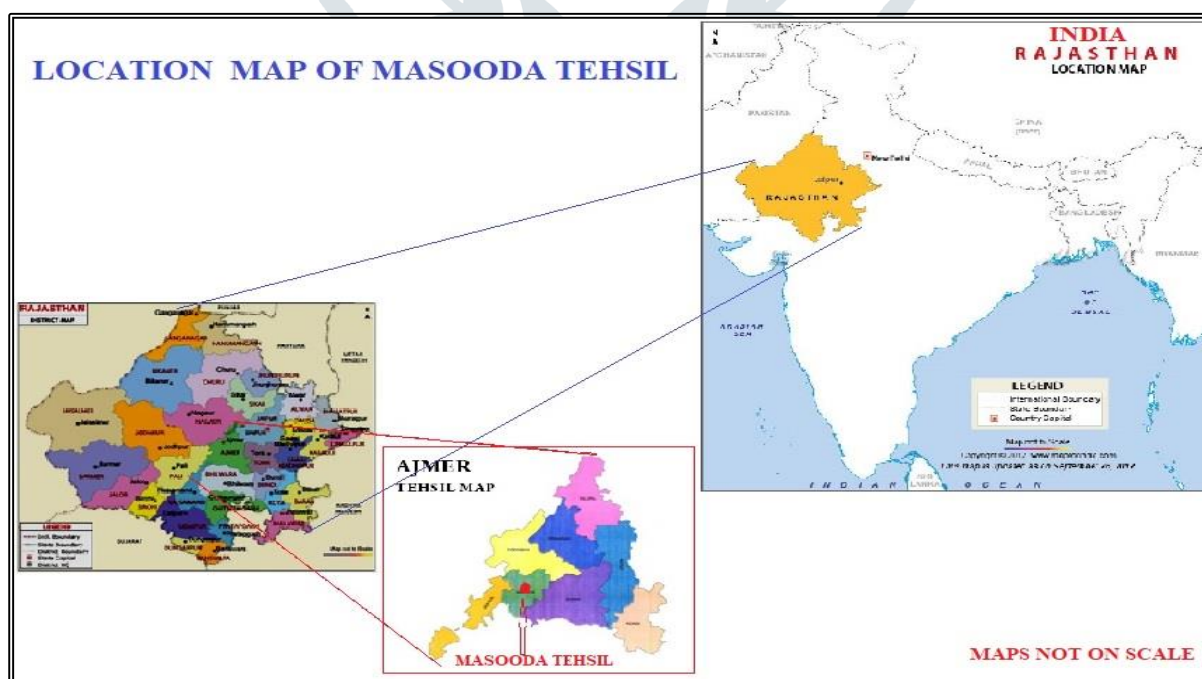


FIGURE: 1 Location of Study area(Masooda tehsil of Ajmer District).

MATERIAL AND METHODS –

We have selected 10 samples from 10 Villages of Masooda tehsil of Ajmer district namely Balesariya, Devgarh, Devmali, Devpura, Dhani Kheda, Hanutia, Jaswatpura, Karnipura, and Nandwada. These ten water samples were collected from ground water sources. Samples were collected in polypropylene bottles. All the samples were examined for five major parameters viz pH, Nitrate, Total dissolve solid, Chloride and Fluoride as per standard methods prescribed in APHA¹.

TABLE -1

Parameters and methods employed in the Physico-chemical examination of samples

S. No.	Parameters	Methods
1	PH	Direct pH meter
2	Chloride	Titrimetric
3	Nitrate	PDS Method
4	Fluoride	Ion selective electrode
5	Total dissolve solid	Conductivity bridge

TABLE -2

Water Quality Parameters by Bureau of Indian Standards²

S. No.	Particulars*	pH	Fluoride	T.D.S.	Chloride	Nitrate
1	Desirable	6.5 -8.5	1	500	250	45
2	MPL	-	1.5	1500	1000	45

*All parameters expressed in mg/l except pH

MPL- Maximum Permissible Limit

RESULT & DISCUSSION

Present study we have collected 10 samples from 10 Villages of Masooda tehsil of Ajmer district. The physico-chemical characteristics of these samples are tabulated in table 2. The water samples were analyzed as prescribed by standard methods of water and waste water examination.

TABLE-3

Water quality parameters of villages of Masooda tehsil (water quality parameters in mg/l)

Sample No.	Name of the Village	Particulars of Sources	pH	Fluoride	T.D.S.	Chloride	Nitrate
1	Balesariya	H.P. Near Tejaji Sthan	7.82	2.71	640	110	10
2	Devgarh	O/W, Public Well Keloo Rd.	8.12	1.20	15140	10300	5
3	Devmali	O/W, Dev Narayan Mandir	7.67	4.30	304	50	10

4	Devpura	H.P., Near Primary School	7.88	5.00	1344	380	25
5	DhaniKhed a	H.P.MahadeojiMan dir	7.67	4.24	1728	660	25
6	Hanutia	H.P. Govt. Sr. Sec. School	8.65	2.13	900	200	5
7	Jaswatpura	O/W SarwajanikJhalara	8.11	3.80	2830	1130	15
8	Karnipura	H.P. Near the Well	7.88	2.62	1536	450	25
9	Nandwada	H.P.HarizanBasti	7.67	1.64	5120	1120	150
10	Shiv Nagar	H.P. Near Primary School	7.21	2.37	1472	450	5

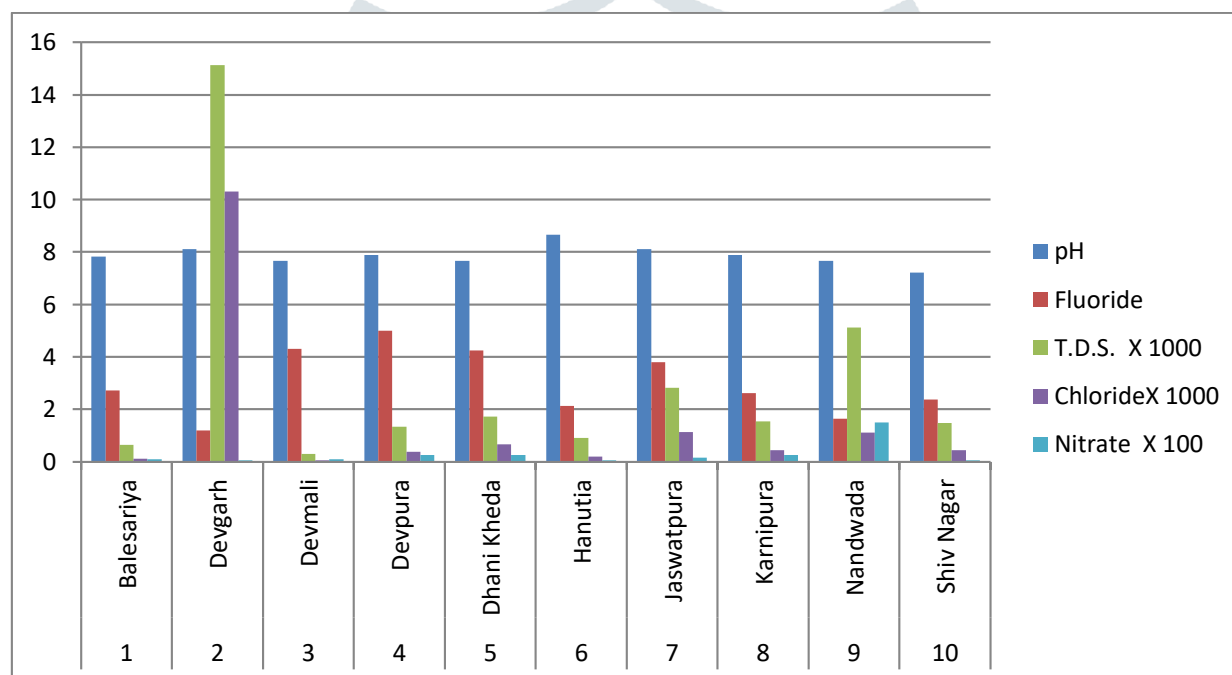


Figure: 2 Water quality parameters of villages of Masooda tehsil, District Ajmer (Water quality parameters in mg/l)

According to the parameter wise observations: The average value of these parameters viz. pH, Fluoride, T.D.S, Chloride and Nitrate are 7.868, 3.001 mg/l, 3101.4 mg/l, 1485 mg/l and 27.5 mg/l respectively.

pH – In this study pH values varied from 7.21 to 8.65 According to pH values majority of ten sources are within the desirable limit, and only one source (sample No-6) is above the BIS limits.

FLUORIDE – Ground water quality in reference to Fluoride is poor. All the sources are above the desirable limit and 90% sources are beyond the Maximum Permissible Limit. The concentration of fluoride in these waters depends principally on the solubility of fluoride containing rocks with which the water is in contact. Fluoride content in the present study are ranged from 1.64 mg/l to 5.0 mg/l. This quantity is very high and harmful for human health causes fluorosis diseases. Total habitations of present study were severely affected by this parameter.

TOTAL DISSOLVE SOLIDS – In this study 9 sources are having TDS level in their ground water in concentration of over 500 mg/l only one sample was in the desirable limit. 50% samples were above the maximum permissible limit. According to TDS concentration 90% sources unfit for drinking purpose.

CHLORIDE- Chloride toxicity has been observed in humans except in the special case of impaired sodium chloride metabolism, e.g. in congestive heart failure⁸. According to chloride concentration 7 sources unfit for desirable limit drinking purpose out of 10 samples studied. The three samples (DevgarhJaswatpura and Nandwada) were above the MPL

NITRATE –Nitrate concentration having more than 45 mg/l is harmful for newly born kids. Nitrate values range is 5 mg/l to 150 mg/l. According to nitrate concentration only one source (Nandwada)unfit for drinking purpose which is having values above desirable as well as MPL.

According to observations, considering the physico-chemical analysis the ground water sample of these more or less all villages are found to be pollutedwith fluoride and TDS contamination.While comparing the values of water quality parameters with respective recommended standards, it was observed that the values of the 5parameters namely pH, Nitrate, are under the desirable limits for drinking water in all the samples in the study area. On the other hand, the concentrations of parameters like fluoride, TDS and Chloridewere found above the desirable limit in most of the samples.

The significant positivecorrelation reveals between Chloride and TDS. This relationships characteristics ofthe surface water and ground water sources in the study area. The correlation analysis of water quality parameters revealed that all parameters were more or less correlated with each other.

RECOMMENDATIONS

Top priority should be given to water quality monitoring and surveillance, low awareness about the importance of water quality at all levels is a major constraint. Many potential problems can be prevented by safe guarding the integrity of a drinking water sources. The indigenous technologies should be adopted to make water fit for drinking after treatment such as defluoridation, desalination etc. The Defluoridation plants based on activated alumina should be attached these hand pumps. The safe drinking water in quality affected areas could also be provided by sanctioning schemes based on surface water sources. In general people should be made aware about fluorosis and the need for consuming defluoridated water. Research and development should continue on defluoridation technology. Water recharging activities with rain water may be initiated in villages having high fluoride, total dissolve solid, nitrate or where all the three parameters are altogether beyond the permissible limits.Rain water harvesting and differential use of water sources should be promoted vigorously in the water quality affected areas. Urban areas: Residential Roof top water harvesting, Storing water in storage tanks for immediate use and artificial ground water recharge. Rural areas: ResidentialRoof top water harvesting, Agriculture areas, Contour bounding and Nala bounding

People should be trained to adopt domestic or community based defluoridation technique.Peoples should use calcium rich diet and adequate use of vitamin C rich food is helpful in fluorosis. Fluoride rich tooth pastes, mouth

wash and other cosmetic items should be prohibited. Pan Masala, gutka and other tobacco chewing preparations in these fluoride affected areas should be banned by Government. Safe water from alternate sources should be supplied, as water from Bisalpur project passing near the fluoride affected villages should be supplied for drinking purpose wherever possible. Traditional water harvesting devices should be encouraged like baories, wells and kunds etc.

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