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ABSTRACT

This paper deals with the results of analysis of Fluoride contamination. The study was carried out for the ground water quality assessment of eight sampling sites of Seoni (M.P.). The present study is focused on assessment of the quality of ground water in rural and urban areas and its effect on human health. The samples were found to have high fluoride concentration then the standard permissible limit of 1.5 mg/l in drinking water. People living in areas were suffering from Fluoride related diseases.

Keywords: *Ground water, Fluorides, Diseases, Assessment.*

INTRODUCTION

Water is an essential resource for all life on the planet. Water covers over 71% of the earth's surface and is a very important natural resource for people. The Earth is full of natural resource needed for the development of mankind. The day by day increased demand has developed new methods of water quality assessment and management. The study was carried out for the ground water quality assessment of Seoni block of Seoni district. Seoni, one of the important tribal area of Madhya Pradesh is located 21^0 36' to $22^0$57' north latitudes and $79^0$19' to $80^0$17' east longitudes. It is bounded by the district Jabalpur in North, Mandla in Northeast, Balaghat in the East, Narsinghpur in Northwest.

Fluoride has a pivotal role in prevention of dental caries and its deficiency may initiate some dental problems. Conversely, excessive exposure to fluoride lead to a number of adverse effect, ranging from mild dental fluorosis to crippling skeletal fluorosis.

Groundwater is the major source of drinking water in rural as well as in urban areas. The study was carried out to assess the ground water quality and its suitability for drinking purpose in most rural habitations of Seoni (M.P.) India. The study area is Seoni (M.P.). Seoni is a block in the Seoni District of Madhya Pradesh, having the total villages 289 and total population is 296,777 (Rural + Urban (2011)).

"Water is life's matter and matrix, mother and medium. There is no life without water." The study of water pollution is selected as it is not ordinary liquid but is the elixir of life. Water is a prime natural resource, a basic human need and a precious national asset. It is indeed required in all aspects of life and health, for producing food, industrial activities, energy generation and maintenance of environment and substance of life and development.

MATERIAL AND METHODS

Water samples from the eight selected sites namely Amakola (S1), Bamhani (S2), Bhata (S3), Gangeruwa (S4), Jamuniya (S5), Bheroganj (S6), Budhwari (S7) and Iswarnagar (S8) and taken in pre-cleaned plastic bottles of 3 liter rinsed with perchloric acid and distilled water used for the sample collection. Samples were analyzed immediately for parameters, which need to be determined instantly and rest of samples were refrigerated at 40^0C to be analyzed later.

The analysis of water samples was determined as per standard methods prescribed by IS: 10500-2012, APHA (1985) and Trivedi (1986). Three parameters for the analysis of water samples taken into were: Physical parameters- Colour, Odour, Temperature, Turbidity, pH, Electrical Conductivity (EC), Total Solids (TC), Total Dissolved Solids (TDS), Total Suspended Solids (TSS). Chemical parameters- Alkalinity, Acidity, Chloride, Carbon dioxide, Total hardness, Calcium, Magnesium, Do, Nitrate, Sulphate, Phosphate, Fluoride, Iron.

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RESULT AND DISCUSSION

The results considered that the groundwater of the study area in general cannot be considered as poor quality but Fluoride concentration high in all sampling sites (Table-1). The present study represents an investigation of the current status of groundwater quality of rural and urban area in Seoni for a period of research. All sampling sites were observed that fluoride concentration is high. The fluoride values are high increased than other parameter. I used of **questionnaire survey** method for the peoples are affected reside in study area (Table- 2, 3 and 4). Due to health problem as- Acne and other skin problem abdominal pain, vomiting, high blood pressure, Joint disorder, Thyroid and exposure to high concentration of fluoride during childhood, when teeth are developing, can result in mild dental fluorosis.

Impact on health:

The groundwater is an important route of human exposure to kinds of contaminants. This study was carried out to investigate the occurrence and spatial distribution of groundwater fluoride in study area. The water contamination was assessed for drinking purposes by comparing it to standard value and the impacts of groundwater on human health were quantified using the health risk assessment.

- A health status survey was conducted on the people residing around the area of urban and rural in Seoni. This survey was conducted to know the impact of groundwater on the health of people and also to create the awareness in the people of area about the environment, environmental pollution and groundwater pollution.
- In this survey, 400 people were interviewed between below 10 years to above 60 year of age. Out of these 400 people, 200 were males and 200 were female. In order to assessment the health impact by groundwater pollution, only those 400 inhabitations from the study area were chosen for interview, who are using groundwater as a source of drinking water(Table-2).
- The selected for survey method "questionnaire survey". The age-wise distribution of sample population in the study area reveals that about 62 (15.5%) of the population belonged to the age group of below 10 years or the child population, 105 (26.25%) respondents were of 10-25 years of age or young population, 120 (30%) respondents were 26-50 years of age or adult population and 113(28.25%) respondents were above 50 year of age or old age population. Direct interview was taken from 10 and above 10 years of individual while information of the health status of below 10 years of age group was taken by their parents/guardian.
- The 10 year of age, 247 (61.75%) people are aware about environment, the percentage of male and female who have the knowledge of environment is environment is 69% and 54.5% respectively. Altogether 60.75% people (66% male and 53.255.5% female) know about environmental pollution. Similarly 61% people (62.5% male and 59.5% female) aware of water pollution. People who know the sources of groundwater pollution were 54.25% (58% male and 50.5% female).
- The information of all the sample respondents, 72.75 % people (69.5% male and 76% female) experienced water shortage during past years. 78.25% people (76% male and 80.5% female) agreed with the fact that groundwater resource in comparison to other water resource is very important to them. Only 12.2% interviewees (11% male, 10.5% female) think that their neighborhood has good drainage system, maintain a high standard of hygiene. 86.75% of respondents (83% male and 90.5% female) reported.
- The information of question 400 respondents, self-reported diseases were claimed by 68.75%; out of this 66% male and 71.5% female were affected by one or other kinds of diseases in previous year. Only 57.5% people (59% male and 56% female) said that they received treatment at the hospitals. Table- 38 shows that in study area, female more affected then male because the reason may be females indulge more in indoor activities (Male members go out to work) thus resulting in more exposure to groundwater.
- Diarrheal disease was the most self-reported disease among the interviewees in the study area that 53.75% of the interviewees were suffered from diarrhea and it found to be prevalent more among females (57%) than males (50.5%).
- The 22.5% people were affected with dysentery while 16.75% people were suffered from vomiting

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sensation. Out of this 24% male and 21% female suffered in the case of dysentery, while 14.5% male and 19% female suffered in the case of vomiting sensation. From table- 4 it is clear that majority of dysentery cases were found in the age of below 10 years of children and people with age group of 26-50 years were less affected with it.

- Digestive problems like acidity, indigestion, constipation, abdominal cramp have been common in persons who are using groundwater. After observing data from we came to know that 48.5% respondents suffered from problems related to digestive system. The females (52.5%) were more affected with these problems than males (44.5%). It is also interesting to note that the major affected people nearly 55.75% were belong to the elderly (>50 years) group.
- Among all the 400 people surveyed 45.5% people were suffered from fever. it is clear that female respondents (56.5%) were more affected with fever than male respondents (34.5%), while furthermore with age of below 10 years (46.77%) and above 50 years (46.01%) were suffered most from fever.
- The overall prevalence of dental fluorosis in the present study among 400 respondents was 59%. Prolonged use of fluoride containing water might be the reason for dental fluorosis in the area. It is observed from table- 3 that the prevalence of dental fluorosis is higher in females (61.5%) than males (56.5%).The possible reason for this could be females get more exposure to fluoride, as most of the females indulged in indoor activities, thus resulting in more consumption of water and in turn more intake of fluorides.
- The age-wise distribution of affected respondents with dental fluorosis shows that the prevalence of dental fluorosis is lowest in children of below 10 years of age group (14.51%). The reason may be, this age group had fewer years of exposure to fluoride. The symptoms of dental fluorosis were found maximum in the age group of 10-25 years (57.14%). It is also found during survey that the symptoms of dental fluorosis were more common in 10-15 years of age group. It is observed during the survey that the majority of sample population had a light form of dental fluorosis: yellow linings or dotted spots on the teeth, it is also observed that the severity of dental fluorosis increased with increasing age in both males and females. During the survey few person were found to have severe dental fluorosis (their teeth were changed to reddish brown colour), mainly in the older age group (>50 years). There was no incidence of health impacts from nitrate, as depicted by 0% reported occurrence of ‘‘blue-baby’’ syndrome, whose symptoms had been explained to the people during the interview.

The respondents 73% people (74% male and 72% female) were agree with the fact that into groundwater causing the health problems in their community. While 73.25% respondents (76% male and 70.5% female) feel that the waterborne diseases are a major health concern in their neighborhood (Table-4).

Table 1 : Showing Annual, Seasonal Mean Variation and Monthly Variation in Fluoride (mg/l) Values of Groundwater Recorded at Different Sampling Sites

S.S.	July	Aug.	Sep.	Oct.	R. M. V.	Nov.	Dec.	Jan.	Feb.	W. M. V.	Mar.	Apr.	May	June	S. M. V.	A. M. V.
S1	11	1.40	0.8	0.91	3.52	8.12	0.55	0.89	2.5	3.29	4.1	1.81	11.1	1.92	4.73	3.69
S2	1.50	4.2	10.20	0.95	4.21	1.52	0.96	0.82	1.9	1.3	1.6	0.93	7.2	1.55	2.82	2.77
S3	11.1	0.96	1.54	9.2	5.67	1.9	0.78	11.5	3.2	4.35	3.11	8.3	2.1	1.8	3.82	4.61
S4	9.20	10.1	1.12	0.75	5.29	12.2	0.89	6.1	1.98	5.29	12.3	0.96	14	1.54	7.20	5.92
S5	0.48	1.80	13.1	0.58	3.99	10.1	0.99	1.8	0.75	3.41	0.92	2.18	1.8	0.86	1.44	2.94
S6	12	1.32	0.54	8.1	5.49	4.30	0.74	1.9	3.1	2.51	3.2	10.2	0.94	0.89	3.80	2.95
S7	1.39	1.9	3.5	0.59	1.84	0.95	10.2	3.2	1.8	4.03	1.94	1.18	3.1	5.16	2.84	2.90
S8	0.96	1.46	2.5	1.12	1.51	0.94	6.4	1.85	1.56	2.68	0.85	4.2	1.83	0.98	1.96	2.05

S.S. - Sampling Station, R.M.V. - Rainy Mean Value, W.M.V. - Winter Mean Value,
S.M.V. - Summer Mean Value, A.M.V. - Annual Mean Value

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Table 2 : Showing personal profile information after interview of 400 individuals by prepared questionnaire at study area

Q. No.	Question	Category	Total Number Of Respondents	Percentage %
2.	Sex	Male	200	50%
		Female	200	50%
3.	Age	<10 years	62	15.5%
		10-25 years	105	26.25%
		26-50 years	120	30%
		>50	113	28.25%
4.	Education	Literate	210	52.5%
		Illiterate	190	47%
5.	Occupation	Employed	208	52%
		Unemployed	192	48%
6.	Residential Period	More than 10 years	280	70%
		Less than 10 years	120	30%

Table 3 : Showing observations after interview of 400 individuals for prepared questionnaire of study area

Q. No.	Disease	Male	%	Female	%	Total No.	%
Environmental Awareness Information							
8.	-	138	69	109	54.5	247	61.7
9.	-	132	66	111	55.5	243	60.7
10.	-	125	62.5	119	59.5	244	61
11.	-	116	58	101	50.5	217	54.2
Exposure Information							
12.	-	139	69.5	152	76	291	72.7
13.	-	152	76	161	80.5	313	78.2
14.	-	22	11	21	10.5	43	10.7
15.	-	166	83	181	90.5	347	86.7
Health Related Information							
16.	-	134	76	148	74	282	70.5
17.	-	132	66	143	71.5	275	68.7
18.	-	118	59	112	56	230	57.5
19.(A)	Diarrhea	101	50.5	114	57	215	53.75
(B)	Digestive Problems	89	44.5	105	52.5	194	48.5
(C)	Dysentery	48	24	42	21	90	22.5
(D)	Vomiting Sensation	29	14.5	38	19	67	16.75
(E)	Fever	69	34.5	113	56.5	182	45.5
(F)	Cholera	10	5	8	4	18	4.5
(G)	Typhoid	12	6	19	9.5	31	7.75
(H)	Hepatitis	15	7.5	25	12.5	40	10
(I)	Skin Disease	3	1.5	9	4.5	12	3
(J)	Malaria	30	15	38	19	68	17
(K)	Others	29	14.5	20	10	49	12.25
20.	Dental Fluorosis	113	56.5	123	61.5	236	59
21.	Skeletal Fluorosis	92	46	80	40	172	43
22.	"blue – baby" Syndrome	Nil	Nil	Nil	Nil	Nil	Nil
General Information							
23.	-	148	74	144	72	292	73
24.	-	152	76	141	70.5	293	73.25

The informations of question no. 8-16 and 23, 24 were taken from the person of above 10 years of age.

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Table 4 : Showing Age Wise Distribution of Some Major Diseases Found In the Study Area.

		DIARRHEA		DYSENTERY		DIGESTIVE PROBLEM		FEVER		DENTAL FLUOROSIS	
Age Group (in years)	No. of People	Affected People	%	Affected People	%	Affected People	%	Affected People	%	Affected People	%
<10	62	42.0	67.7	20	32.25	12	19.35	29	46.77	10	14.51
10-25	105	60.0	57.2	20	19.04	38	36.19	41	39.04	60	57.14
26-50	120	63.0	52.5	28	23.4	82	68.4	60	50	103	85.84
>50	113	50.0	44.3	22	19.46	62	54.86	52	46.01	63	55.75
Total	400	215	53.8	90	22.5	194	48.5	182	45.5	236	59

The health related information of below 10 years age group was taken from their Parents/Guardians.

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CONCLUSION

In conclusion, from the results of the present study it may be said that high concentration of fluoride in groundwater and people in these rural areas are therefore at higher potential risk of contacting water-borne disease. Groundwater in Seoni area requires precautionary measures before drinking so as to prevent adverse health effects on human beings. The fluoride values are high increased than other parameter. The peoples are affected reside in study area. Due to health problem as- Acne and other skin problem, abdominal pain, vomiting, high blood pressure, Joint disorder, Thyroid and exposure to high concentration of fluoride during childhood, when teeth are developing, can result in mild dental fluorosis. This does not affect the health of the teeth, but the discoloration may be noticeable.

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