



Short Communication

Physico-Chemical Analysis of Drinking Ground Water in Varangaon Region, Dist Jalgaon, Maharashtra, India

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Abstract

The open well water quality in Varangaon region was assessed for the effect on the water quality which is used in domestic as well as agricultural purposes. The open well samples were collected from the five wells around this region. The physico-chemical parameters such that colour, odour, temperature, pH, Electrical conductivity, total hardness, total dissolved solids, calcium, magnesium, chloride, total alkalinity, dissolved oxygen, chemical oxygen demand and biological oxygen demand were analysed and to know monsoon status in this region of water quality. Drinking water quality of premonsoon season was better than post monsoon season, one sample was slightly alkaline along with high dissolved solids.

Keywords: Drinking water standards, water quality, ground water, physico-chemical parameters.

Introduction

Water is one of the abundantly available substances in nature; It is an essential constituent of all animals and vegetables matter and forms about 75% of the matter of earth crust¹.

Water is mostly used for industrial and municipal purposes in this area open well water is used only for agricultural as well as drinking purposes².

Today human activities are constantly adding industrial, domestic and agricultural waste to ground water reservoirs at an alarming rate³. Ground water contamination is generally irreversible i.e. once it is contaminated it is difficult to restore the original water quality of the aquifer. Excessive mineralization of ground water degrades water quality producing an objectionable taste, odor and excessive hardness⁴.

It is always better to protect ground water first rather than recycling on technology to clean up water from contaminated source^{4,5}.

Polluted ground water is the major cause for the spread of epidemics and chronic diseases of man. It causes typhoid, jaundice, dysentery, diarrhea, tuberculosis and hepatitis⁶⁻⁸.

The use of polluted ground water for irrigation purposes severely damages crop and decreases grain production⁹.

Study area: The Varangaon area lies between latitudes 30°19'28" and longitudes. 38°28'35".

Thermal Power Station (Deepnagar), Ordnance factory varangaon, Milk plant, ash pond is situated in this region. The ground water quality of the study area is adversely affected by ash water by thermal power station. Increased population and improper drainage system have potential to influence the ground water quality⁵.

Sample Collection: The sample collection consist of well in rural area, ground water samples collected from five (5) well at various locations within study area during pre and post monsoon season. Details of sampling location are as follows. Samples were collected in plastic container to avoid unpredictable changes in characteristics at 8 am to 11am as per standard procedure¹.

Drinking water samples in the study area are as follows: S1- Nageshwar temple well, S2- Vilhala village well (Near to ash pond), S3- Susari village, S4- near Achegaon village, S5- Renuka mata Temple.

Material and Methods

The collected samples were analysed for different physico-chemical parameters such as temp, colour, odour, pH, electrical conductivity, TDS, DO, COD, BOD, Alkalinity, Total Hardness, Calcium, Magnesium hardness and chloride as per the standard methods. And the results were compared with the Indian standard for potable water⁵.

Results and Discussion

The water quality of different ground water samples have been carried out for temp, pH, Electrical conductivity, Total

dissolved solids, Total hardness, total alkalinity, calcium, magnesium, chlorides dissolved oxygen, biological oxygen demand, and chemical oxygen demand, The status of water quality of these ground water sources are presented in table^{5,9}.

The pH of ground water samples varied between 6.8 to 7.3 and 7.1 to 7.6 during pre and post monsoon season respectively. The pH value of vilhala village well water was found to be 7.6 which is higher in all the samples^{6,13}.

Electrical conductivity varied between 260 to 477 and 340 to 514 $\mu\text{mho/cm}$. in pre and post monsoon season respectively. The same trend was observed in case of TH of various ground water sources. It varied from 54 to 98 and 118 to 198 mg/l pre and post monsoon season respectively^{8,9}. Total dissolved solids ranges between 250 to 310 and 270 to 380 mg/l pre and post monsoon season respectively. Value is slightly higher in post

monsoon than pre monsoon season¹⁰. The total hardness of sample vilhala village is moderately hard¹¹.

The calcium ranges 21 to 84 mg/l and 118 to 240 mg/l in pre and post monsoon season respectively¹², magnesium ranges 30 to 50.8 and 132 to 140 mg/l pre and post monsoon season respectively, chloride ranges 15 to 19.1 and 17.8 to 31.5 mg/l in pre and post monsoon season respectively¹³.

Alkalinity ranges from 140 to 215 and 185 to 225 mg/l in pre and post monsoon season respectively¹⁴.

Dissolved oxygen ranges from 3.14 to 4.15 and 4.28 to 5.39 mg/l pre and post monsoon season respectively, chemical oxygen demand 1.98 to 3.05 and 2.00 to 3.10 mg/l in pre and post monsoon season respectively, and biological oxygen demand varied from 0.4 to 1.2 and 2.8 to 4.5 mg/l in pre and post monsoon season respectively¹⁴.

Table-1

samples	pH		Electrical conductivity($\mu\text{mho/cm}$)		Total hardness(mg/l)		Temp °c	
	Pre monsoon	Post monsoon	Pre monsoon	Post monsoon	Pre monsoon	Post monsoon	Pre monsoon	Post monsoon
S1	7.0	7.2	260	340	54	11	28	27.1
S2	6.9	7.6	477	514	98	198	28.1	27.2
S3	6.8	7.1	313	415	64	127	29.1	27.3
S4	7.2	7.6	379	486	78	128	28.3	28.1
S5	7.3	7.5	359	501	85	125	20.4	28.1

Sample	TDS (mg/l)		Ca ⁺⁺ (mg/l)		Mg ⁺⁺ (mg/l)		Chloride(mg/l)		Alkalinity(mg/l)	
	Pre monsoon	Post monsoon	Pre monsoon	Post monsoon	Pre monsoon	Post monsoon	Pre monsoon	Post monsoon	Pre monsoon	Post monsoon
S1	250	270	47	198	50.8	133	15	20.1	210	220
S2	310	342	84	127.3	30	132	18	30.5	215	225
S3	260	281	64	228	35	140	19.1	31.5	140	185
S4	240	300	21	240	41	122	17.3	17.8	198	205
S5	301	380	82	221	38	137	15.4	18.4	148	201

Sample	D O (mg/l)		COD (mg/l)		BOD (mg/l)	
	Pre monsoon	Post monsoon	Pre monsoon	Post monsoon	Pre monsoon	Post monsoon
S1	4.22	5.21	2.10	2.30	0.4	2.8
S2	3.14	4.28	3.05	3.10	0.6	3.7
S3	4.15	5.10	2.05	2.15	0.7	3.2
S4	3.89	5.15	1.98	2.00	1.1	4.5
S5	3.75	5.89	2.32	2.42	1.2	4.2

Table-2
Classification of ground water based on hardness

Total hardness C _a CO ₃	Water class	Sample	
		Pre monsoon	Post monsoon
<75	Soft	S1,S3	
75-150	Moderately hard	S2,S4,S5	S1,S3,S4,S5
150-300	Hard		S2

Conclusion

In general ground water quality of varangaon region in rural area of well water is not harmful to human being except near to ash pond vilhala village open well (S2) hardness is higher 200mg/l so hard water and sample S1,S3,S4, S5 are moderately hard S1,S3 in pre monsoon season are soft water this is due to the percolation of ash water from ash pond vilhala village.

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