

Chemical Properties of Drinking Water of Some Villages in Sangamner Tahasil, Dist- Ahmednagar, Maharashtra, India and its Impact on Human Health

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ABSTRACT

This paper is an attempt to assess the effect of drinking water quality on health of the people living in Sangamner Tahasil Dist- Ahmednagar, Maharashtra, India. Drinking water samples were collected from 18 different Villages in Sangamner Tahasil and analyzed for physicochemical parameters such as Temperature, pH, Total Dissolved Solids, Calcium, Calcium Hardness, Magnesium, Total Hardness, Electrical Conductivity, Chlorides, sulphates, Sodium, Iron Potassium, Carbonate, Bicarbonate, total alkalinity. The found values of physicochemical parameters were compared with the World Health Organization water quality standards. Study of all these characteristics and correlation studies indicates that in some of these studies areas water was polluted and not suitable for drinking purpose. The drinking water of the area needs some degree of treatment before consumption and prevention steps to be taken from contamination.

Key words: Drinking water, physicochemical parameters, Electrical Conductivity, Hardness, Total Dissolved Solids.

Introduction

Water plays a vital role in human life. The consequence of urbanization and industrialization leads to spoil the water, for agricultural purposes ground water is explored in rural areas. During the last decade this is observed that the ground water get polluted drastically because of increased human activities^{1,2}. Consequently number of cases of water born disease has been seen which cause of human hazards^{3, 5, 6}. So basic monitoring on water quality has been necessitated to observe the demand and pollution level of ground water⁴.

The present work is an attempt to examine the water quality of various potable water sources and its impact on human health.

Experimental

Drinking water of different polluted locations at sangamner area studied during the period of pre monsoon. Electrical Conductivity values were measured using Elico CM 180 Conductivity Bridge. Total alkalinity was measured by titration with standard 0.1M HCl using methyl orange and phenolphthalein as indicators⁷. Standard procedures⁸⁻¹¹ involving spectrophotometer, flame photometer

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and volumetric were used for the determination of water quality parameters. All the chemicals used were of AR grade.

Table.No.1 Average results of chemical parameters

Sampling Point	pH	EC	TDS	Turbidity	HAR Total	HAR Ca	Ca	Mg	Na	K	Fe	Total Alk.	Cl	SO4
1	7.84	1019	662	1.8	300	192	76.8	26	74.7	0.3	0.1	151	142	90
2	7.9	3910	2542	3.1	860	420	168	107	622	0.5	0.1	231	1040	400
3	7.81	5510	3582	6.2	1060	560	224	122	1190	1.7	0.1	387	1690	525
4	7.4	4350	2828	1.5	840	480	192	87	735	0.2	0.01	404	990	575
5	7.5	1245	797	2.5	400	150	60	61	100	5	0.4	325	178	40
6	7.84	1398	912	1	508	108	43.2	97	78.4	4.5	-	384	150	55
7	8.03	1863	1211	3	468	216	86.4	61	185	0.5	0.1	238	342	128
8	7.09	1930	1260	0.1	340	180	72	39	226	0.6	-	197	332	154
9	7.43	4560	2970	4	732	296	118.4	106	880	5.7	-	335	1280	440
10	7.75	972	633	2	300	136	54.4	40	66.5	0.5	-	197	112	70
11	7.74	1144	744	0.1	448	92	36.8	87	47.2	0.8	0.01	386	78	72
12	7.31	1770	1150	0.1	500	300	120	49	182	0.7	0.04	341	294	93
13	7.57	1575	1024	10	448	344	137.6	25	55	0.6	0.01	317	100	97
14	7.24	1336	868	2	412	264	105.6	36	96.9	2	0.1	173	174	121
15	8.11	694	439	0.5	160	76	30.4	20	33	0.3	0.03	173	44	11
16	7.95	575	374	10	220	56	22.4	40	46.8	0.6	0.6	176	90	47
17	7.43	1019	662	0.2	304	132	52.8	42	52	0.2	0.01	288	98	32
18	7.13	2240	1460	2	528	488	195.2	10	330	0.6	0.05	173	621	95
19	7.79	1870	1220	1	400	148	59.2	61	160	3.9	-	230	240	126

*All the values are in mg/l, except pH and EC. Units of EC are mmho/cm

RESULTS AND DISCUSSION

Most of the water samples are slightly alkaline due to presences of carbonates and bicarbonates. All the sampling points showed pH value between the 7.09-8.11, these values within the limit prescribed by WHO. Hardness of water depends upon the amount of calcium and magnesium salts. Hardness value in the studied area between 160-1060 mg/L. 7 sampling points showed higher hardness values than the prescribed limit by WHO.

Alkalinity is due to the presence of bicarbonate, carbonate and hydroxide compounds of calcium, sodium and potassium. Alkalinity itself is not harmful to human beings¹⁰. Alkalinity value in the studied area varied between 151-404 mg/L. 9 sampling sites showed higher alkalinity value within the prescribed limit by WHO.

Calcium value in the studied area varied between 22.4-224 mg/L. 10 sampling sites showed higher calcium values than the prescribed limit by WHO. If calcium is present beyond the maximum limit causes the incrustation of pipes and deterioration of clothes.

Too high magnesium causes the nausea, muscular weakness and paralysis in human body when it reaches a level of about 400 mg/L¹². Magnesium value in the studied area varied between the 10-122 mg/L. 9 sampling sites showed higher magnesium value within the prescribed limit by WHO.

The iron values in the studied area varied between 0.01-0.6 mg/L. If the value of iron is higher in water prevents the self purification of water and thereby produces adverse effect for aquatic lives.

Chloride values in the studied area between 44-1690 mg/L. 8 sampling sites showed the higher chloride concentration than the prescribed by WHO.

In the present study, Sulphate in the studied area varied between the 11-575 mg/L. 4 sampling sites showed the higher chloride concentration than the prescribed by WHO.

Turbidity values in the studied area between 0.1-10 NTU. 3 sampling sites showed the higher turbidity concentration than the prescribed by WHO.

When electrical conductivity values exists at 3000µmho/cm, the generation of almost all the crops would be affected and it may result in much reduced yield¹³. It is considered to be an induction of the total dissolved salt content. Conductivity value in the studied area varied between 575-5510 mhos/cm.

Total Dissolved Solids – it is important parameter in drinking water quality standard. It develops particular taste to the water and at higher concentration reduces its potability water with more than 500 mg/L usually has a disagreeably strong taste. High TDS levels generally indicate hard water, which can cause buildup in pipes, valves and filters. In the present study, TDS in the studied area varied between the 374-3582 mg/L. 17 sampling sites showed the higher chloride concentration than the prescribed by WHO. So it can conclude that water is hard at these sampling sites, which necessities the softening of water prior to its use.

The summation of calcium hardness and magnesium hardness is regarded as the total hardness of water. In the present investigation, it has been observed that calcium concentration is in between 30-224 mg/L and magnesium hardness 10-122 mg/L.

Sodium values in the studied area between 33-1190 mg/L. The higher the concentration of sodium can be related to cardiovascular diseases and in woman toxemia associated with pregnancy. 16 sampling sites showed higher sodium concentration than the prescribed by WHO and Potassium values 0.2-5.7 mg/L. 6 sampling sites showed higher potassium concentration than the prescribed by WHO.

CONCLUSION

According to WHO, nearly 80% of all the diseases in human beings are caused by water^{14, 15}. The water quality parameters of the various areas of some villages in sangamner are contaminated and the quality is poor for drinking purpose. After purification treatment only this water can be used for drinking. Drinking water pollution in the studied area should be controlled by the proper environment management plan to maintain proper health conditions of people.

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