

A STUDY TO ASSESS THE EFFECT OF GROUND WATER QUALITY AND ITS IMPACT ON HUMAN HEALTH OF PEOPLE OF OSMANABAD DISTRICT INDIA

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ABSTRACT

Water is the basic necessity of our life and it is an important natural resource which forms the core of natural ecological system. I have tried our best to study the local water conditions scientifically along with past history. Due to the increase of population limited source of water we have tried to fulfill the need of water from various sources like the dug wells, tube wells, local water bodies (lake and pond) and from the river from Osmanabad District. Since last five years it is observed that people who are dependent upon the tube wells are suffering from some of the diseases like constipation, kidney problem, hair loss, graying of hair, acidity etc. i. Objective of study is to find out the quality of groundwater and its impact on mankind. ii. To know more about the chemicals present in the groundwater in different areas (Ca & Mg), iii. To find out the effect of excessive ground water calcium on human health. Data has been collected through experimental method and observation. The result of chemical analysis of water shows that water of tube wells contains calcium carbonate, bicarbonate, magnesium carbonate in excess (more than standard limits) this excess of calcium is the responsible for the above mentioned diseases. Public awareness for the use of this groundwater is done by contacting the people and by public of this area also the news paper etc. Some remedial methods also suggested for the use of this water. I am sure if people take precautions they can be protected from such diseases and they can enjoy healthy and cheerful life.

Keywords: Groundwater pollution, Osmanabad District, Physicochemical parameters, TDS, etc.

INTRODUCTION

Ground water is one of the major sources of water which fulfill the requirement of mankind in different sectors from last few decades. It plays an important role to enhance the economics of India and ensures food security. Due to rapid industrialization, urbanization and agricultural development causes several type of contamination in ground water resources in various part of country which result many harmful effect towards environment. The central ground water board is being monitored to check the quality and aspects of ground water samples in the country.

Water is essential to the existence of man and all living things. Groundwater occurs almost everywhere beneath the earth surface not only in a single widespread aquifer, but also in

thousands of local aquifer systems. Man's activities such as food production, nutrition are dependent on water availability in adequate quantities and good quality. Water is the most common and widespread chemical compound in nature which is a major constituent of all living creatures. The quality of water is of great importance as it is commonly consumed and used by households. Ground water which occurs beneath the earth surface is considered free from contamination, hence usable but anthropogenic as well as natural factors are affecting the quality as well as quantity of this valuable resource. It has been estimated that once pollution enters the subsurface environment, it may remain concealed for many years, becoming dispersed over wide areas of groundwater aquifer and rendering

groundwater supplies unsuitable for consumption and other uses.

MATERIAL AND METHODS

The current study was designed to investigate the conditions of groundwater contamination in the study areas. The physicochemical study was undertaken by randomly collected 15 borehole water samples from Osmanabad District during August 2014 to January 2015. Samples were drawn with a pre-cleaned plastic polyethylene bottle. Prior to sampling, all the sampling containers were washed and rinsed thoroughly with the groundwater. Water quality parameters such as pH and electrical conductivity (EC) were analyzed immediately. Total Dissolved Solid (TDS) were computed by

multiplying the electrical conductivity (EC) by a factor (0.64). Total hardness (TH) as CaCO₃ and calcium (Ca) were analyzed titrimetrically, using standard EDTA. Magnesium (Mg) was calculated by taking the differential value between total hardness (TH) and calcium (Ca) concentrations. Chloride (Cl) was determined titrimetrically by standard AgNO₃ titration. The content of Sodium (Na) and Potassium (K) in groundwater was estimated flame photometrically. All parameters are expressed in milligrams per litre (mg/l) and mill equivalents per liter (meq/l), except pH (units) and electrical conductivity (EC). The electrical conductivity (EC) is expressed in micromhos/cm (μS/cm) at 250°C.

Result of the physicochemical parameters of Osmanabad District
All parameters are in mg/L except pH and Turbidity, Turbidity in NTU

Sample	Temp 27°C	color	odor	Tur.	pH	TDS	TH	Ca	Mg	Cl	Na	K	Fe	F	SO ₄	NO ₃
(S1)	27	colorless	odorless	0.3	7.5	642	520	137	48	19	22	3	0.19	0.37	41	29
(S2)	27	colorless	odorless	0.4	6.8	365	274	79	24	24	13	3	0.16	0.12	29	16
(S3)	27	colorless	odorless	0.3	8.2	392	274	69	79	34	25	1	0.19	0.39	48	19
(S4)	27	colorless	odorless	0.3	8.1	413	780	47	39	76	46	4	0.15	0.25	11	15
(S5)	27	colorless	odorless	0.5	7.7	583	408	380	34	94	50	2	0.15	0.21	62	20
(S6)	27	colorless	odorless	0.4	7.5	722	392	206	55	80	77	9	0.37	0.25	26	32
(S7)	27	colorless	odorless	0.3	7.6	1216	229	130	63	26	20	6	0.70	0.25	23	46
(S8)	27	colorless	odorless	0.1	8.4	1181	683	168	62	142	49	39	0.49	0.31	45	31
(S9)	27	colorless	odorless	0.3	8.5	867	564	91	81	128	210	105	0.13	0.47	54	32
(S10)	27	colorless	odorless	0.3	8.6	1250	229	130	63	26	20	6	0.76	0.25	23	48
(S11)	27	colorless	odorless	0.1	8.9	1180	681	168	62	145	49	46	0.48	0.31	45	31
(S12)	27	colorless	odorless	0.3	8.0	394	274	69	79	34	25	2	0.18	0.38	48	19
(S13)	27	colorless	odorless	0.3	8.1	414	804	47	39	76	46	4	0.15	0.25	11	15
(S14)	27	colorless	odorless	0.5	7.9	588	408	383	34	97	53	6	0.34	0.21	67	22
(S15)	27	colorless	odorless	0.4	7.4	729	391	206	55	80	77	22	0.30	0.27	26	34

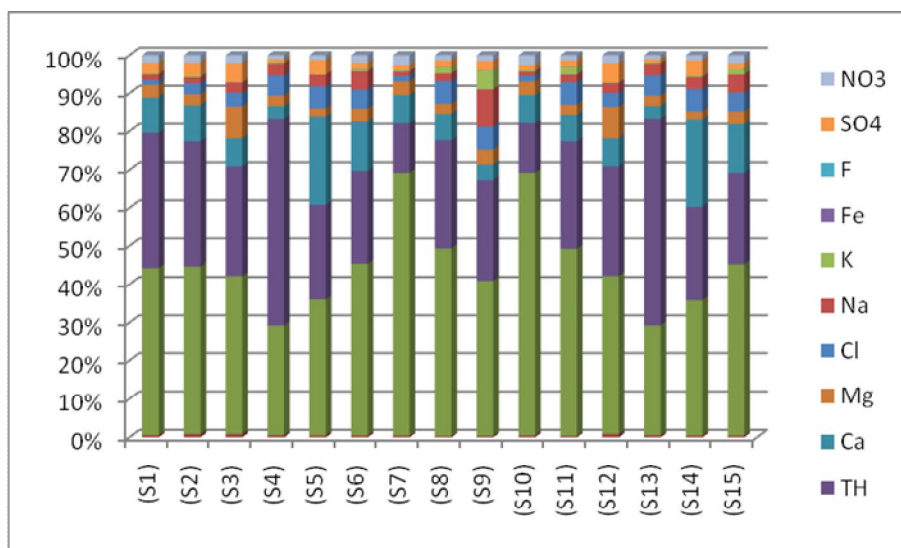


Fig: Graphical representation of parameters

RESULT AND DISCUSSION

The collected water sample from different stations was the colorless and odorless and the temperature of the entire water sample is maintained 27°C.

pH

It is a measure of how acidic/basic water is. The range is from 0 - 14, with 7 being neutral. pH less than 7 indicate acidic, whereas a pH greater than 7 indicates a basic. pH is really a measure of the relative amount of free hydrogen and hydroxyl ions in the water. The standard range pH is 6.5 to 8.5 given by ISI and WHO. In the analysis the pH of S10 and S11 water sample has the pH above the standard range (8.6 & 8.9 respectively).

Turbidity

Turbidity is the measure of relative clarity of a liquid. Clarity is important when producing drinking water for human consumption. Turbidity can provide food and shelter for pathogens. If not removed, turbidity can promote growth of pathogens in the distribution system, leading to waterborne disease outbreaks, which have caused significant cases of gastroenteritis throughout the United States and the world. Although turbidity is not a direct indicator of health risk, numerous studies show a strong relationship between removal of turbidity and removal of protozoa. In the water sample of all stations have the turbidity below the standard range of ISI and WHO.

TOTAL HARDNESS

In ground water hardness is mainly due to carbonates, bicarbonates, sulphates, chloride of Ca and Mg. The data of the analysis reveal that the total hardness of S4 (780 mg/l), S13 (804 mg/l), are above the standard value of WHO.

TOTAL DISSOLVE SOLID (TDS)

TDS is directly related to the purity of water. The TDS is the term used to describe the inorganic salts and small amounts of organic matter present in solution in water. The principal constituents are usually calcium, magnesium, sodium, and potassium cations and carbonate, hydrogen carbonate, chloride, sulfate, and nitrate anions. The TDS of water sample of S7 (1216 NTU) and S10(1250 NTU) having the range above the standard values of WHO.

CALCIUM

CALCIUM is a mineral that is an essential part of bones and teeth. The heart, nerves, and blood-clotting systems also need calcium to work but

higher the amount of calcium causes harmful effects on the health. In the water sample of the many villages of Osmanabad District the calcium is present above the range given by WHO, the villages such as S5 (380 mg/l), S14 (383 mg/l).

MAGNESIUM

Hardness of water is directly concern with the magnesium and the sample of the different villages of Osmanabad District ranging below the standard value given by the WHO.

CHLORIDE

Chloride of water sample of the different villages of Omarabad District ranging below the standard value given by the WHO.

SODIUM

The sodium concentration of the all sample of Osmanabad District is lower than the prescribed limit by WHO and ISI.

POTASSIUM

It is found that the content of potassium is higher in the water sample of S9(109 mg/l)

IRON

The concentration of Iron in the water sample of S7 (0.70 mg/l) & S10 (0.76mg/l) ranging above the standard value given by the WHO and ISI.

FLUORIDE

Fluoride can occur naturally in water and the fluoride concentrations above recommended levels, which can have several long term adverse effects, including severe dental fluorosis, skeletal and weakened bones. The World Health Organization recommends a guideline maximum fluoride value of 1.5 mg/L as a level at which fluorosis should be minimal. In the analysis of the water sample it is found that the fluoride is below the standard range.

SULPHATE

Sulfate is a constituent of TDS and may form salts with sodium, potassium, magnesium, and other cations. Sulphate is commonly found in nature and can be present at concentrations of a few to several hundred milligrams per liter.

NITRATE

The nitrate concentration in the water sample of the S7 (46mg/l) and S10(48 mg/l) ranging above the standard limit of ISI.

CONCLUSION

The physico-chemical analysis of bore well of Osmanabad District reveals that water is not fit for drinking but needs some primary

treatment except S7 & S10 because of high TDS & total hardness.

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