Physico Chemical Analysis of Groundwater Samples from Patur, District Akola (MS).

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Abstract:

Water is essential for life. On earth the water is in the oceans, glaciers, underground and on land. By hydrological process pure water cycle continuously get recharge Groundwater is renewed by percolation of rainwater from soil and rock. Potable water is primary need of human as it serves as lubricant, regulates body temperature and provides the basis for the body fluids and metabolism. At global level most of the deaths were occurred due to waterborne diseases. Thus, monitoring altered physico chemical parameters is essential to check water quality. The Drinking water samples of 5 different bore wells from area Patur taluka of Akola district were collected in plastic bottles and Physico chemical parameters of water such as Colour, Odour, turbidity, pH, EC, TDS , Chloride, Alkalinity, Hardness, calcium, magnesium, Sodium, Potassium, sulphur and fluoride were analysed. From the result it is concluded that 5 different bore wells of Patur were found safe for drinking and domestic use.

Keywords: Physico chemical, Patur, bore well etc.

I. Introduction:

The first life on earth came from water. Water is essential for life. On earth the water is in the oceans, glaciers, underground and on land. By hydrological process pure water cycle continuously gets recharge. Groundwater is renewed by percolation of rainwater from soil and rock. Water quality is a fundamental concern for people as it is directly related to health. Water is an important requirement for industry, agriculture, economic development and many nutritious ecosystems [1]. Drinking water is a basic human need as it acts as an ointment, regulates body temperature and provides the basis for body fluids and metabolism [2]. It is an important requirement for maintaining personal hygiene.

In the process of purifying most of the impurities were added to drinking water, apart from that the level of pollution is accelerated by human anthropological activities such as adding pesticides, pesticides, chemical fertilizers and rainwater management, pollution, urbanization, industrialization and emissions. All pollutants are making it unsuitable by altering its physico chemical properties such as color, odor, pH, electrical conductivity, chloride content, alkalinity, hardness, Melt Oxygen, Organic Oxygen, Chemical Need Oxygen, as well as soluble solids [3]. At the global level most deaths are due to water-borne diseases. Therefore monitoring of modified physico chemical parameters is important to assess water quality. Current research work undertaken to analyse the physico chemical properties of randomly selected drinking sources (bore wells) From TalukaPatur, District Akola (MS) India.

II.   Materials and Methods:

For the present research work one liter water was collected from each sampling site in the month of January 2021. The Drinking water samples were collected fromChani, Digras Bk, Sagola, Sasti andTulanga Bk. these 5 different villages of Patur taluka. Samples were collected in plastic bottles and preserved according to standard methods [4]. Collected water samples were having varying depth of 30 to 100 meters. Patur is located in Akola District of Maharashtra having Geological position 20°30'48" N, 76°48'31" E. It has an average elevation of 286 meters from sea level. It is situated in *Vidharbha* region of Central Maharashtra. District Akola is famous for cotton industry and Experimental area is famour for lemon production. Akola's water bearing formation is basalt (Deccan trap) Physical parameters of water such as Colour, Odour, turbidity, pH, Electrical fractured, jointed and weathered basalt under phreatic conditions and the soil type is medium black cotton soil [5].

Figure01: location of study area showing in the map of Maharashtra.
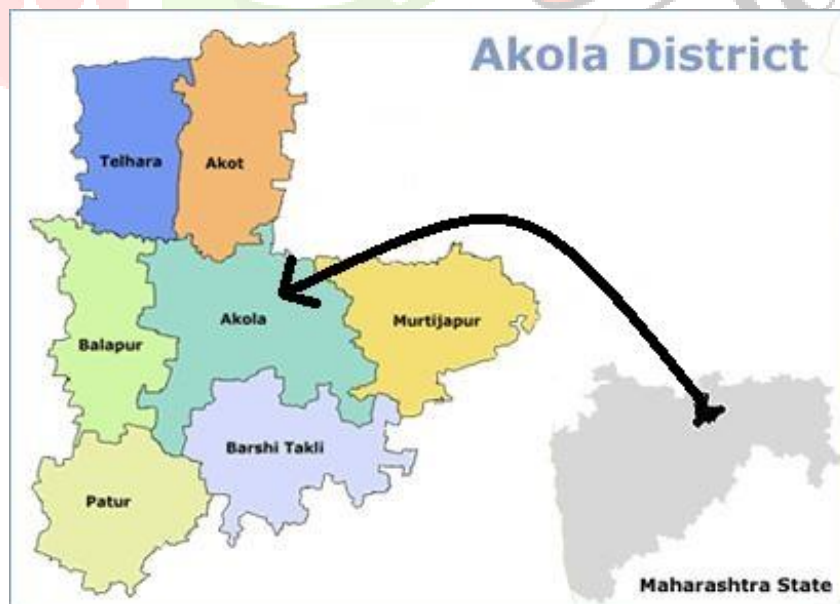
Conductivity, Total Dissolved Solids were analysed on sampling site and chemical parameters such as Chloride, Alkalinity, Hardness, Calcium, magnesium, sodium, potassium, Sulphur dioxide and Florine were analysed within 24 hours by standard methods [6-7].

All physico chemical parameter were performed in triplicates and average was considered as the reading also data was analyzed statistically.The simple linear correlation analysis has been carried out to find out correlation betweenparameters [8]. The analyzed data were compared with standard values recommended by WHO [9].

III.   Result and Discussion:

The physico chemical parameters of drinking water collected from5 different sites from different villages of Paturwere recorded and presented in table 01 while Table 02 shows the correlation between each parameter.

3.1.   Physical parameters:

All samples were colourless and odourless at the time of collection.The condition of the acidic and alkaline sample is determined by pH.All samples are acidic or almost neutral except for a slightly basic Tulanga sample. Therefore all drinking water samples are available within the required quantity according to the WHO and ICMR [10]. The pH of all the sampling sites ranged from 6.89 to 7.53. ThepH controls chemical state of many nutrients, phosphate, nitrate and also

Table 01: Physico chemical parameters of water samples from Akola.

Sr. No	Parameters	Chani	S.E.	Digras Bk.	S.E.	Sangola	S.E.	Sasti	S.E.	Tulanga Bk	S.E.
1	Colour	Colourless	-	Colourless	-	Colourless	-	Colourless	-	Colourless	-
2	Odour	odourless	-	odourless	-	odourless	-	odourless	-	odourless	-
3	Turbidity	1.00	±0.0000	1.00	±0.0000	1.00	±0.0000	1.00	±0.0000	1.00	±0.0000
4	Alk(mg/L)	512.33	±1.2019	490.67	±2.9627	470.00	±1.0000	452.67	±1.7638	331.33	±1.8559
5	pH	7.53	±0.0770	7.29	±0.0475	7.02	±0.0726	7.03	±0.0667	6.89	±0.0216
6	TDS (mg/L)	719.00	±1.5275	683.33	±1.2019	692.33	±2.8480	677.33	±1.7638	645.67	±1.2019
7	EC (µS/cm)	1343.00	±2.5166	1216.33	±3.1798	1194.67	±2.6034	1219.67	±2.6034	1187.33	±1.2019
8	Hard(mg/L)	801.00	±2.0817	773.33	±0.8819	794.67	±2.0276	780.00	±1.1547	748.33	±0.8819
9	Chloride(mg/L)	288.00	±2.3094	324.33	±0.3333	520.67	±1.7638	365.33	±1.6667	750.67	±0.3333
10	Ca (mg/L)	71.33	±0.6667	67.33	±0.3333	46.67	±0.3333	63.33	±0.6667	51.36	±0.3611
11	Mg (mg/L)	103.00	±0.5774	101.94	±0.5300	123.72	±0.1470	128.05	±0.7228	222.67	±1.8559
12	Na	29.67	±0.3333	18.67	±0.3333	27.33	±0.3333	25.67	±0.3333	24.33	±0.3333
13	K	4.33	±0.3333	2.36	±0.0735	5.20	±0.1155	6.17	±0.1667	4.59	±0.0484
14	So4	98.76	±0.4066	75.29	±0.0270	159.09	±0.5448	161.53	±0.2373	53.67	±0.3333
15	F	0.42	±0.0145	0.35	±0.0078	0.66	±0.0118	2.95	±2.2750	0.71	±0.0339

±S.E. -Standard error

dissolved oxygen [11]. Electrical conductivity ranges from 1187.33 to 1343µs/cm. Electrical conductivity is positively correlated with TDS (0.8443) and Hardness (0.6348). Same results were recorded by Patil and Patil (2010) [12].Electrical conductivity determines the capacity of water to transmit electric current. It signifies the total number of dissolved salts [13]. TDS is the dissolved solids and it indicates the behavior of salinity in the groundwater. Water having more than 500 mg /L is not considered for drinking [14]. Lowest TDS is recorded in samples of Tulanga (645.67) while Highest TDS is found in samples of Chani (719.00).

Generally, it is assumed that TDS and Hardness are positively correlated with kidney stone patient but it is not related on the parameter it depends on drinking habits of people [15].

3.2 Chemical Parameters:

Water said to be alkaline when concentration of OH ion is more than H ions. Alkalinity ranges from 330.33 to 512.33 mg/L.The alkalinity of ground water is because of carbonates and bicarbonates [16]. Concentration of alkaline earth metal cations combienly present in water is called as Hardness. Among five sampling sites

Table 02: Correlation Matrix of different water quality samples formAkola.

	pH	EC	TDS	Alk	Hard	Cl	Ca	Mg	Na	K	So4	F
pH	1											
EC	0.7589	1										
TDS	0.9144	0.8443	1									
Alk	0.6015	0.9241	0.7999	1								
Hard	0.8725	0.6348	0.9489	0.6308	1							
Cl	-0.9237	-0.7719	-0.7920	-0.6431	-0.7044	1						
Ca	0.5932	0.8131	0.5271	0.7411	0.3067	-0.8195	1					
Mg	-0.9903	-0.6885	-0.8512	-0.5084	-0.8230	0.9345	-0.5858	1				
Na	0.1370	0.2284	0.4765	0.5265	0.5753	-0.0166	-0.0958	-0.0363	1			
K	-0.2259	-0.4230	-0.0876	-0.1002	0.1580	0.2164	-0.3734	0.2292	0.6663	1		
So4	0.5992	0.0397	0.5135	0.0725	0.7329	-0.5030	-0.0124	-0.6319	0.3777	0.5442	1	
F	-0.0968	-0.3742	-0.2121	-0.1897	-0.0398	-0.1215	0.0479	0.0221	0.1168	0.7304	0.5241	1

the highest Hardness was recorded 801.00 mg/L at site Chani while lowest hardness was recorded 748.33 mg/L at siteTulanga. According to Kanan (1991) among five samples water form three were found moderate hard and rest of two samples were found very hard [14].Chloride was recorded highest in sample of Tulanga and lowest in sampleChanii.e.750.67&288.00 respectively.Too much concentration gives a salty taste to the water and the water ends up being unsafe to drink. According to the WHO [9].250 mg /L is safe for drinking and only two sample were found near to safe for drinking.Calcium is an important determinant of water hardness and it also function as a pH stabilizer because of its buffering quality. Calcium also gives water a better taste. Magnesium is safe and widely available in water absolutely essential for good health. The recommended daily intake is 400-420 mg/day. Calcium and magnesium recorded in low to moderate in water samples lowest calcium found in Sangolasample 46.67 mg/L, whereas highest calcium concentration found in Chani71.33mg/L. Highest magnesium concentration found in TulangaSample i.e.222.67mg/L and lowest found in Digras sample 101.94. Sodium is recommended in drinking water not exceeds 20mg/L in order to avoid adverse effect on taste. Highest sodium was recorded in sample of Chani29.67 mg/L whereas lowest found in Digras18.67 mg/L. Potassium Normally found in drinking water are generally low and do not pose health concern. Highest potassium i.e. 6.17 found in Sasti, whereas 2.36 found in Digras. Sulphate neither usually significant health hazards, Sulphate can have a temporary laxative effect on human body.

Highest sulphate recorded in 161.53 mg/L inSasti whereas 53.67 mg/L at Kumbhari. Fluoride helps to rebuild and strength the tooths or enamel. Water fluoridation prevents tooth decay keeping the tooth strong and solid. Excess fluoride most commonly in drinking water can causes fluorosis. Highest fluorine 2.95 mg/L at Sasti while lowest 0.35 mg/L at Digras.

IV. Conclusions:

It is concluded from the present research work that water collected from 5 different bore well of Five different villages form Patur Taluka of Akola district were found safe for drinking and domestic use.

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