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Assessment of Quality of Drinking Water from Different Areas of Mulchera Gadchiroli(M. S.)

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Abstract: ***The present study is focused on measuring the quality of drinking water in rural areas of Mulchera (Gadchiroli district). The water samples of hand pumps were collected from different area of Mulchera and analyzed to determine the physical and chemical parameters like pH, electrical conductivity (EC), turbidity, TDS, DO, BOD, COD, alkalinity, chloride, fluoride, nitrate, TH, calcium, magnesium and iron. The analysis of various parameters using standard methods and their comparison with WHO standard values, suggested that most of the parameters were within permissible limit given by Bureau of Indian standards (BIS).To assess the quality of water, whether it is safe for drinking purpose or not by the comparative physicochemical analysis using standard method, water sample under study were collected from different hand pump water. Their physical and chemical properties of water were examined and analyzed, to correlate the readings of hand pump water. Concentration of parameters beyond the limits in some samples could be reduced and could be an invaluable source for domestic purposes in the region. The present paper accounts water quality of various area of Mulchera in Gadchiroli district and their efficiencies respectively.***

I. INTRODUCTION

Water is the one of the essential source of life on the earth, it also performers and indispensable activities in earth ecosystem, biosphere and biomedical cycle. As the water is basic need to sustain life, it is acquired from every know source. Water pollution affects drinking water, rivers, lakes and oceans all over the world, which consequently harms human health and the natural environment. Water pollution includes sewage and waste water, industrial waste, oil pollution, marine dumping, atmospheric deposition, radioactive waste. However at the same time it cannot be ignored that the drinking water or consumption of contaminated water in any way is the greatest risk to the human and animal life due to the presence of pathogenic[1-6] organism. Water gets contaminated normally due to either direct or indirect entry of sewage, domestic or solid waste disposal or human or animal excreta. As such the contaminated water carries a number of several of pathogenic organism and possesses great potential to spread infection diseases in short time among the sizable pollutions of the community. These pathogenic can cause the diseases that vary in severity from mild to severe, sometimes fatal. Hence the most of the communicable diseases are attributed to their water born origin.

II. MATERIALS AND METHODS

The water samples of hand pumps were collected from different area of Mulchera (Gadchiroli district). The water sample collected in clean, air dried one liter polyethelene bottle. Two water samples were collected from Tarun Nagar and labelled as sample A and B. Two water samples were collected from Bhawanipur and labelled as sample C and D. One water sample were collected from Sunder Nagar and labelled as sample E. It was then brought into laboratory for physicochemical analysis. All water samples was analyzed for physicochemical analysis using standard procedure recommended by IS specification.

III. RESULT AND DISCUSSION

The physicochemical parameter of all water samples and values of all water samples with WHO and BIS standard are summarized in Table 1. The quality of water is influenced by various factors. The water quality result in terms of physicochemical analysis is discussed as follow. All the samples are colorless and odorless.

A. pH

It is one of important parameter in tasting water quality. It measure hydrogen ion concentration of water sample. The permissible limit of pH in drinking water is within 6.5 to 8.5 according to BIS. In the present study pH values are ranging from 8 to 8.4.The maximum pH was reported for B and D samples.

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B. Electrical Conductivity (EC)

The electrical conductivity of water sample was found to be varying from722 µS/cm to 4168 µS/cm. The sample C, D and E was found to have EC above permissible value. The low value of electrical conductivity of samples A and B indicates presence of lower total dissolved salts in water.

C. Turbidity

All water samples shows below 1 NTU turbidity except sample D.

D. Total Dissolved Solid (TDS)

The total dissolved solids in water mainly composed of chlorides, sulphate and bicarbonate of Ca and Mg ions. The TDS of water samples lies in the range of 469 to 2709 ppm. A and B samples showed permissible limit whereas the sample C, D and E shows above standard level.

E. Dissolved Oxygen (DO)

It determines the quality of water and helps to understand self purification ability of water. The low value of DO may be due to high organic matter. In the present work the dissolved oxygen ranges from 7.6 to 12.8 mg/l. The DO of all samples lie in standard range.

F. Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD)

The COD and BOD both values are directly proportional to organic matter. The permissible limit of BOD as per prescribed by WHO and BIS is 3 mg/l. In the present work, BOD of water samples ranges 3.33 - 5.34 mg/l. The BOD of all water samples are not complying standard WHO and BIS specification.

The maximum permissible limit for COD is 10 mg/l. In present work COD ranges from 0.0032 to 0.0176 mg/ml. The COD of all samples lie in standard range.

G. Total Alkalinity

The permissible value of alkalinity is given by 600 ppm. The alkalinity of all water samples shows range from 192 to 592 ppm within limit.

H. Chloride

The standard value of chloride in drinking water is 500 ppm. The values of chloride found in all the samples within limit.

I. Fluoride

The standard value of fluoride in drinking water is 1.5 mg/l. The values of chloride found in all the samples below 1 mg/l.

J. Nitrate

The standard value of nitrate in drinking water is 45ppm. It is one of highly water quality degrading constituents in water samples. All the water samples show normal range of nitrate.

K. Total Hardness (TH)

The standard value of TH in drinking water is 600 ppm. It is the measure of extent of carbonate, bicarbonate, chloride and sulphate of calcium and magnesium.

In present study total hardness is ranges from 216 to 882 ppm. The total hardness values of samples A, B and E are within limit whereas other shows value in above limit.

L. Calcium and Iron

The concentration of calcium and iron in all water samples shows normal range.

M. Magnesium

In present study magnesium is ranges from 47 to 207 ppm. The magnesium values of samples A, B and E are within limit whereas other shows value in above limit.

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Table 1: Physico-chemical analysis of water samples

Sr. No.	Parameter (unit)	Different areas of Mulchera (Gadchiroli)				
		Sample A Tarun Nagar	Sample B Tarun Nagar	Sample C Bhawanipur	Sample D Bhawanipur	Sample E Sunder Nagar
1	Color	colorless	colorless	colorless	colorless	colorless
2	Odor	odorless	odorless	odorless	odoless	odorless
3	PH	8.3	8.4	8	8.4	8.3
4	EC (µS/cm)	949	722	3032	4168	1963
5	Turbidity (NTU)	0.2	0.5	0.1	1.6	0.1
6	TDS (ppm)	617	469	1971	2709	1276
7	DO (mg/l)	10.53	11.73	9.47	7.6	12.8
8	BOD (mg/l)	5.2	3.33	3.34	4	5.34
9	COD (mg/l)	-	-	0.0048	0.0176	0.0032
10	Alkalinity (ppm)	286	192	504	592	328
11	Chloride (ppm)	25	22	291	457	195
12	Fluoride (mg/l)	0.71	0.42	0.79	0.35	0.54
13	Nitrate (ppm)	8.74	23.17	38.07	37.96	31.98
14	TH (ppm)	400	216	668	882	450
15	Calcium (ppm)	29	24	42	32	48
16	Magnesium (ppm)	77	47	152	207	98
17	Iron (ppm)	0.03	0.13	0.09	0.38	0.03

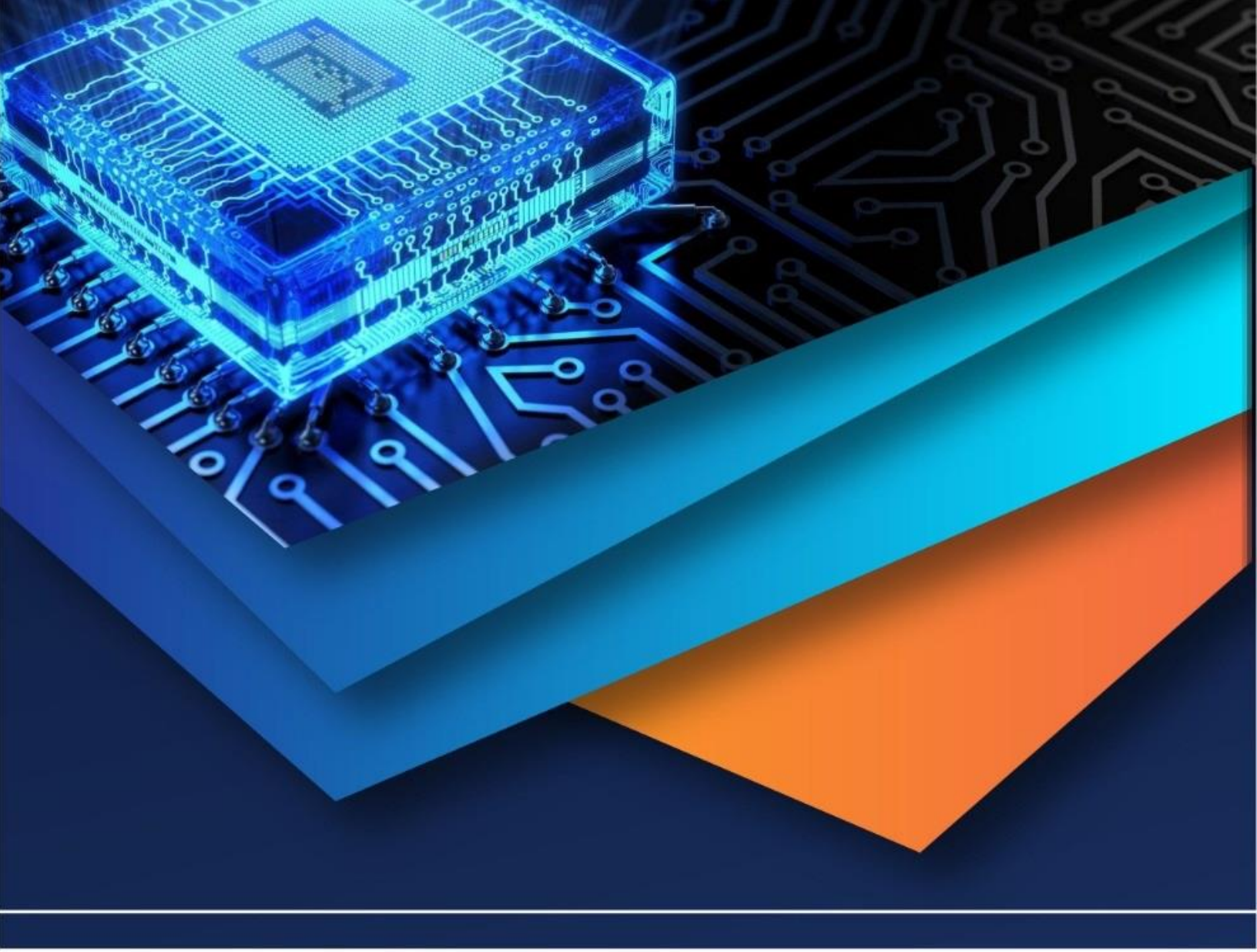
IV. CONCLUSION

In the present work the physicochemical analysis of most of sample are within limit. The samples A (Tarunnagar), B (Tarunnagar) and E (Sundarnagar) is used for drinking purposes except samples C (Bhawanipur) and D (Bhawanipur). In sample C total hardness **(**TH) and magnesium is above the range. In sample D total dissolved solid (TDS), total hardness **(**TH) and magnesium is above the range. Therefore rapid and suitable preventive measures are essential for keeping good water quality and health human beings[7].

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