

Analysis of Water Quality Parameters of Ground Water in Walkheda Village in Dhule District of Maharashtra, India

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Abstract:- Ground water are important sources of drinking water for many communities, especially in rural areas. However, the quality of this water can be impacted by various factors such as natural geological processes, human activities and environment pollution. Therefore, regular analysis of ground water is necessary to ensure its safety and suitability for human consumption. This paper presents a comprehensive review of the methods and techniques used for ground water analysis. The review covers the different parameters that are analysed such as pH, total dissolved solids, electrical conductivity, total hardness, chlorides, calcium, magnesium, dissolved oxygen, total alkalinity, sodium, potassium and various types of contaminants such as heavy metals, pesticides and organic compounds. Additionally, the paper highlights the significance of water quality on public health and the environment. The observed values of these parameters were compared with the standards given by WHO and ISI. It was found from the present study that there is variation in many physio-chemical parameters. Some of the samples were found within the permissible limits of the given standards while some samples are beyond the acceptable values of the standard, indicating that for such samples there is poor potability might be due to contaminations from sewage and other water-soluble pollutants. Hence there need for proper conservation and management of ground water resources, conducting campaign on health awareness and importance water purification among the peoples in such study area before utilizing such poor-quality water for drinking purpose. Overall, this paper highlights the importance of ground water analysis for ensuring the safety and suitability of water for human consumption and suggests that regular testing and treatment can go long way in preventing waterborne illness and environmental pollution.

Keywords:- Ground Water, Physio-Chemical Parameters, Contamination, Human Health.

I. INTRODUCTION

Water is an elixir for the life. The quality of water is of vital concern for mankind because it sustains life. It is matter of history that population of drinking water caused water born disease, epidemics and is still looming large of the horizon of developing countries like India. Adequate supply of potable safe water is absolutely essential and is the basic need for all human being on the earth. Due to rapid industrialization and subsequent contamination of ground water sources, water conservation and water quality management has now a days assumed very complex shape. Attention on contamination and its management has become a need of the hour, because of its far reaching impact on human health.^{1,2}

II. STUDY AREA

India is a vast country with an area of about 806 million acres. The area under investigation is one of the most rural village walkheda in district Dhule of maharashtra (India). The district of Dhule, formerly known as west khandesh and categorised as district head quarters since 1960. Walkheda village is situated along the bank of Panzarariver. The residents mostly depend on the subsurface reservoir of water is open wells, bore wells and hand pumps apart from the river water.

The present study is directed towards the assessment of the ground water quality in village walkheda, which is generally considered difficult to analyse, detect the problems and hard to resolve. The duration of sampling is during the month of April, 2023. All the sample were collected in clean polythene cans of two-litre capacity and brought to the laboratory without the addition of any preservation and subject to the physio-chemical analysis within 24 hours after collection. The details regarding the locations are given in table 1.

Table 1 Sampling Points and Places (Village-Walkheda, Tahsil- Shindkheda, Dist- Dhule, Maharashtra.)

Sr. No	Location Place	Type of well
S ₁	Walkheda South side	Open Well
S ₂	Walkheda North side	Open Well
S ₃	Walkheda East side	Open Well
S ₄	Walkheda West side	Open Well
S ₅	Walkheda Grampanchayat well	Open Well
S ₆	Kanchanpur Grampanchayat well	Open Well

III. EXPERIMENTAL

The samples collected were subjected to various physio-chemical analysis in order to assess their quality and potability water samples were analysed using standard methods.^{3,4} Physio-chemical parameters such as temperature, PH, Total dissolved solids, Electrical conductivity, Total hardness, Total chlorides, calcium, magnesium, Dissolved oxygen, Alkalinity, Sodium and Potassium were determined using standard methods.⁵

IV. RESULTS AND DISCUSSION

The values obtained for various physio-chemical parameters after analytical determination are given in table 3. The values were compared with the standard values given by WHO:2003⁶. and ISI (10500-1993)⁷ as given in table 2.

Table 2 Standard Values for Drinking Water.

Sr. No	Characteristics	WHO (2003)	ISI (10500-1993)
1	pH	6.5-9.5	6.5-8.5
2	TDS	500.00	500.00
3	Electrical Conductivity	1400.00
4	Total Hardness	500.00	300.00
5	Chlorides	250.00	250.00
6	Calcium	200.00	75.00
7	Magnesium	30-150	30.00
8	Dissolved Oxygen	5.00
9	Alkalinity	200.00	200.00
10	Sodium	250.00
11	Potassium	45.00

All Values in milligram per litre, Except pH and EC.

Table 3 Ground Water Samples (Type Open Well) in summer season.

Sample	Type	Temp	pH	TDS	EC	TH	Cl	Ca	Mg	DO	Alkalinity	Na	K
S ₁	OW	30.2	7.6	644	1125	154	490	57.2	35.3	4.9	280	72	6.4
S ₂	OW	29.7	7.3	751	1252	208	611	88.4	59.2	4.4	178	94	8.1
S ₃	OW	31.1	7.5	684	1311	130	532	48.9	28.9	4.6	170	84	3.4
S ₄	OW	30.4	8.3	915	1578	524	618	189.1	87.4	3.8	235	92	7.3
S ₅	OW	31.5	7.8	824	1348	223	192	102.6	49.1	5.2	424	98	5.4
S ₆	OW	30.7	7.6	776	1229	301	674	165.3	62.7	4.8	238	76	7.2

*OW(open well),Temp(Temperature),TDS(Total Dissolved Solids), EC(Electrical Conductivity),TH(TotalHardness),Cl(Chlorides),Ca(Calcium),Mg(Magnesium),DO(Dissolved Oxygen),Na(Sodium),K(Potassium)

➤ Temperature:

Present open well water samples in summer season (April 2023) it was observed that temperature value ranges from 29.7⁰ C to 31.5⁰ C. The minimum temperatures was recorded for samples. S₂ and maximum temperatures was recorded for sample S₅. The increase in temperatures decreases potability of water due to the unpleasant taste produced by CO₂ and other gases. Thus, the taste of sample differs from place to places.⁸

➤ pH Value :

Present open well water samples in summer season it was observed that pH value ranges from 7.3 to 8.3. The minimum pH value was recorded for sample S₂ and maximum pH value was recorded for sample S₄.

➤ TDS :

Present open well water sample in summer season it was observed that the minimum TDS value was recorded for sample S₁ is 644 mg/lit. while maximum TDS value was recorded for sample S₄ is 915 mg/lit.

The higher values of TDS could be due to low water levels within aquifers and sediment effect.⁹ Higher TDS value recorded in summer was 915 mg/lit. The high TDS value may be due to ground water pollution. The consumption of water having high dissolved solids and hardness may cause harmful effect like kidney stone formation and other related diseases. It may taste bitter, salty or metallic and may have unpleasant odours. High TDS water is less thirst quenching.

➤ Total Hardness :

Present open well water samples in summer season it was observed that the minimum total hardness value was recorded for sample S₃ is 130 mg/lit. while maximum total hardness value was recorded for sample S₄ is 524 mg/lit.

➤ Chlorides :

Chloride content values in summer season it was observed that minimum value was recorded for sample S₅ is 192 mg/lit and maximum value was recorded for sample S₆ is 674 mg/lit.

The Chloride content variation from 53.8 to 535.1 mg/lit in ground water samples at Ahmednagar (M.S.). They concluded the high chloride concentrations in some of the well water due to severe contamination caused by sugar mill effluents.¹⁰

samples near industrial belt ranging from 145 mg/lit. to 290 mg/lit. They concluded the ground water pollution caused by waste waters.¹¹

➤ *Total Alkalinity:*

Total alkalinity values in summer season it was observed that minimum value was recorded for sample S₃ is 170 mg/lit. and maximum values was recorded for sample S₅ 424 mg/lit.

Water samples of above study area showed higher alkalinity values in summer season might be due to increase in concentration of carbonates and bicarbonates in the water. The alkalinity values at shahada, in the ground water

V. CONCLUSION

Ground water samples were collected from the open wells located in and around walkheda village to determine their quality and fitness for drinking purposes. Their pH, Electrical conductivity, Total hardness, DO, Ca⁺⁺, Mg⁺⁺, Na⁺ and K⁺ contents are within the permissible limits, set by WHO and ISI. However water samples S₄ and S₆ have inferior potability due to effluents from household and sewage among these water samples S₄, is highly polluted and unfit for drinking purpose.

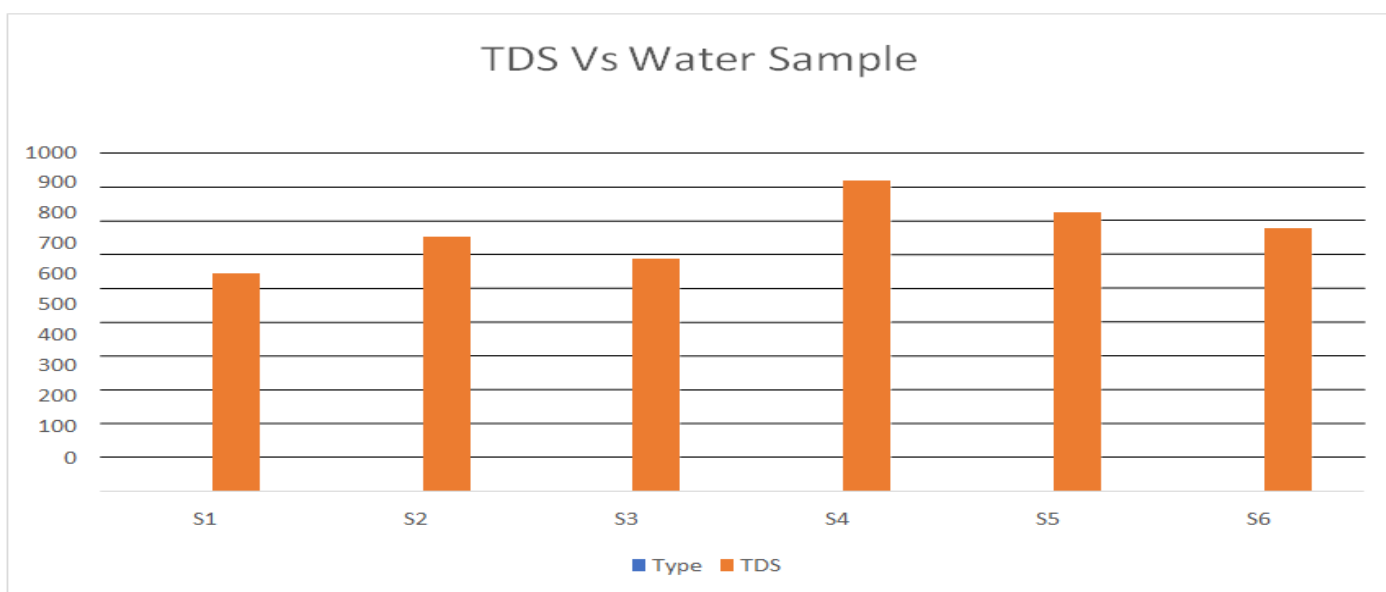


Fig 1 TDS in the Water Sample (Line Indicates Permissible Limit)

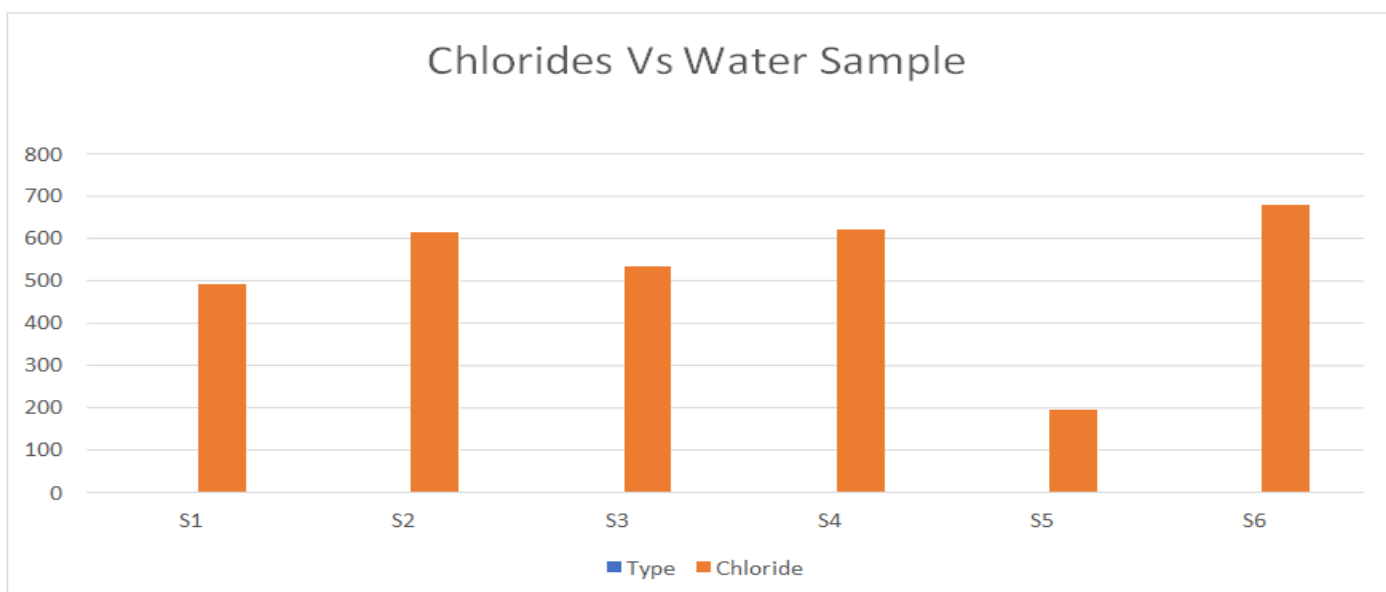


Fig 2 Chlorides in the Water Sample (Line Indicates Permissible Limit)

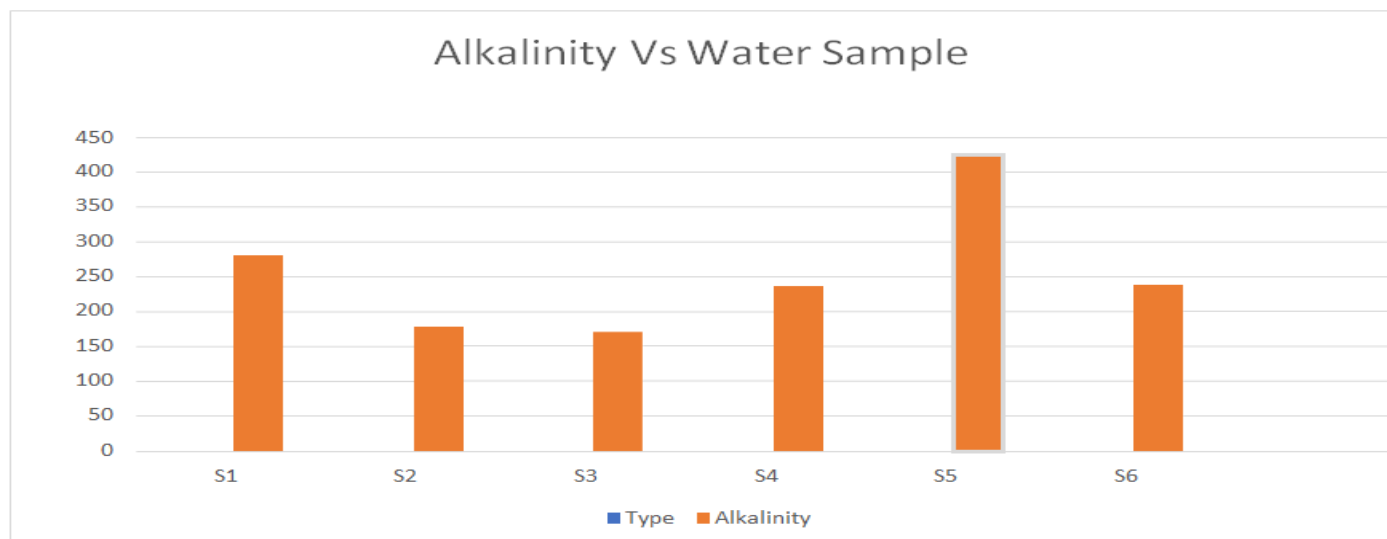


Fig 3 Alkalinity in the Water Sample (Line Indicates Permissible Limit)

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