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Analyzing of Drinking Water Quality: A Case Study Loni Village, Ahmednagar District, and Maharashtra State, India.

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Original Research Article

ABSTRACT:

The present study evaluates the Total Dissolved Solids (TDS) and Electrical Conductivity (EC) of drinking water in loni Village, Ahmednagar District, and Maharashtra State. To assess water quality, eight samples of raw water (inlet) and eight samples of purified water (outlet) from water purifiers were collected and analyzed for TDS and EC. The raw water showed TDS levels ranging from 262 to 510 ppm, while the purified water showed TDS levels ranging from 148 to 280 ppm. Similarly, EC values ranged from 397 to 637 µS/cm demonstrating a linear relationship with TDS, It was observed that the water quality, in terms of TDS and EC, is excellent too good in the area. However, the low concentration of TDS in the purified water may pose health risks due to its flat, insipid taste and corrosive nature, which can lower the pH of the water.

KEY WORDS: Quality, Drinking, Total Dissolved Solids, Electrical Conductivity (EC), pH.

INTRODUCTION:

Water is a fundamental and essential resource for various purposes, including domestic use, irrigation, commercial activities, and industrial processes. In rural parts of India, water for drinking is sourced from both surface and ground resources. In the absence of surface water sources, groundwater, found in subsoil and rock, often serves as a natural mechanical filter, improving water quality by removing suspended solids and microbial contaminants. However, as water filters through soil and rock, some minerals can dissolve in excess, altering the quality of the groundwater. In many villages, people rely on readily available water sources such as wells and sometimes bore wells. While pure water from precipitation would be ideal for human consumption, achieving the highest water quality criteria in rural areas is often impractical. Therefore, it is necessary to adhere to minimum water quality standards for drinking water. The World Health Organization first outlined these criteria in 1958 as international standards for drinking water, with revisions in 1963, 1971, and 1984-85, and subsequent editions in 1993 and 1996 (WHO, 1996).

MATERIAL AND METHOD:

To obtain reliable data on TDS and EC in water quality investigation, several important

considerations were taken into account: the methods employed the purpose of the study, and the data needed. Accordingly, both field and laboratory methods were adopted to fulfill the study's objectives. Specifically, the grid method was used for sampling selection and collection of water.

A total of eight raw water samples (S1 to S8) from the inlet of water purifiers and eight corresponding purified water samples from the outlet were collected simultaneously from the village in September and November 2023. The collected samples were filtered and analyzed for TDS and EC in the laboratory following the methods outlined by APHA and AWWA (1975) and Trivedy and Goel (1986).

RESULT AND DISCUSSION:

It is observed from Table 1 that the raw (inlet) water in the water purifier shows TDS levels ranging from 262 to 510 ppm in the study area. The higher concentration of TDS (510 ppm) at the S8 sampling station may be attributed to the dissolution of salts from rocks as a primary source (USDA, 1954; Raymahashay, 1986) and agricultural runoff in the area (Daji, 1985). Similarly, EC ranges from 397 to 637 µS/cm, indicating a linear relationship with TDS in the area (Anna F. Rusydi, 2019). The water quality, in terms of TDS and EC, is excellent too good at all sampling stations (Rubiat Islam, 2017).

However, the purified (outlet) water shows TDS levels ranging from 148 ppm (S7) to 280 ppm (S1). The low concentration of TDS in purified water in the study area may pose health risks due to its flat, insipid taste and corrosive nature, which can lower the pH of the water (Rubiat Islam et al., 2017). On the other hand, literature surveys (Sana Akram and Fazal-ur-Rehman, 2018; Rubiat Islam et al., 2017) have revealed that prolonged consumption of water with high TDS and essential salts like calcium and magnesium may cause kidney stone formation. Such water may taste bitter, salty, or metallic and have unpleasant odors. High TDS interferes with the taste of foods and beverages, making them less desirable to consume. Some of the individual mineral salts that contribute to TDS pose various health hazards. The most problematic are nitrates, sodium, sulfates, barium, cadmium, copper, and fluoride.

Table 1: TDS and EC of Raw (Inlet) and Purified (Outlet) Water Samples in Loni Village, Ahmednagar District

Sample No. (S- Sampling station)	Raw (inlet) water		Purified (outlet) water	
	TDS (ppm)	EC(µS/cm)	TDS (ppm)	EC(µS/cm)
S1	408	637	280	420
S2	308	468	276	419
S3	262	397	225	340
S4	460	591	259	393
S5	312	474	194	293
S6	287	436	198	299
S7	300	456	148	222
S8	510	502	200	302

CONCLUSION:

The palatability of drinking water is rated by panels of tasters in relation to its TDS levels: excellent (less than 300 ppm), good (between 300 and 600 ppm), fair (between 600 and 900 ppm), poor (between 900 and 1200 ppm), and unacceptable (more than 1200 ppm) (Bruvold and Ongerth, 1969). According to the Bureau of Indian Standards (BIS), the ideal TDS for drinking water is below 300 mg/L, with a maximum permissible limit of 600 mg/L. The World Health Organization (WHO) recommends a TDS level of 300 mg/L and an EC of no more than 1500 µS/cm (Anna F. Rusydi, 2019).

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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COMPETING INTERESTS:

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