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Study of Water Quality from Home Water Purifier with Special Reference to Total Dissolved Solids (TDS) and Electrical Conductivity (EC) At NimgaonJali Village, District Ahmednagar (MS)

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Abstract: The present work deals with evaluation of TDS and EC of drinking water from home water purifier in NimgaonJali Village of Ahmednagar district of Maharashtra State. The NimgaonJali village and its area lies between 19° 32' 12" to 19° 36' 52" N latitude and74° 22' 15" to 74° 24' 18" E longitude in Survey of India toposheet no. 47 I/6 and not having modern water supply scheme. To assess the quality of water in all eight sample of raw (inlet) and eight sample of purified (outlet) water from water purifier was collected and analyzed for TDS and EC. It is observed that raw i.e. inlet water in water purifier shows the TDS ranging from 252 to 408 ppm. The purified (outlet) water shows TDS ranges from 138 to 270 ppm. Similarly, EC ranges from 387 to 627 µS/cm and shows linear relation with TDS of water samples. It is seen that the water quality in terms TDS and EC is excellent to good in area. However, the low concentration of TDS in purified water in the study area may pose human health because of its flat, insipid taste; it also corrosive in nature as it lowers the pH of water. Hence, population in the study area should adjust their purifier for optimum concentration of TDS to avoid any health problem.

Key words: Quality, Drinking, Total Dissolved Solids, Health.

1. INTRODUCTION

Water is fundamental and essential resource for wide use in different purposes viz. domestic, irrigation, commercial, industrial etc. The water is available from surface and ground resource in rural part of India for drinking purpose. In absence of surface water source the percolated water through ground act as a main source of water. The water while percolating through soil, subsoil and rock; improves its quality by retaining suspended solid and biological contaminant. Similarly some minerals from soil and rock get dissolved in water in excess quantity and change the quality of ground water. It is the fact that, in many parts of India the available surface and groundwater is not suitable for drinking purpose; mainly because of biological and chemical contamination (Kulkarni, 1990). In past many studies (Handa, 1981; Krupanidhi, 1984; Bhargava, 1985) have reported that water bodies are getting contaminated due to domestic, agricultural and industrial waste. The contaminant often infiltrate up to the phreatic zone of aquifer resulting in unacceptable concentration of TDS and other salts (Pondhe et.al. 1992). Such contaminated water even spread endemic diseases like cholera, typhoid, diarrhea, hepatitis etc. The review of these literatures indicates that the problems of water quality are threatening the rural population. This is because, till today the people in villages are dependent on readily available source of water through well and some time through bore well. Hence, it would be desirable to have if possible, pure water as obtained from precipitation for human requirement. However, in rural area it is impossible to reach the highest water quality criteria. It is therefore necessary to follow minimum water quality parameters for water that is used for drinking purpose. Such quality criteria first time spelt out by World Health Organization in 1958 as international standards for

drinking water and revised in 1963, 1971 and published in 1984-85 edition. Similarly, in 1993 and 1996 successive edition was published (WHO, 1996). The water quality parameters such as pH, Hardness, Calcium, Magnesium, and Dissolved Oxygen, Biological oxygen demand, Chemical oxygen demand etc. are very useful for quality evaluation of water (Pal et al, 2015). But, frequently used water quality parameters are TDS and EC as they relate with each other (TDS=k(EC) and can be measured easily (Anna F Rusydi, 2017). The value of k will increase with ions of water but many times it depends on activity of specific dissolved ion, average activity of all ions in liquid and ionic strength (Hem, 1985; Hayashi, 2004; Siosemarde et.al., 2010). Therefore, it becomes essential to assess the TDS and EC of water for required quality of water. In view of this, present work was undertaken to study the water quality from Home Water Purifier with special reference to Total Dissolved Solids (TDS) and Electrical Conductivity (EC) at NimgaonJali Village, as this village not having any modern water supply scheme for drinking water.

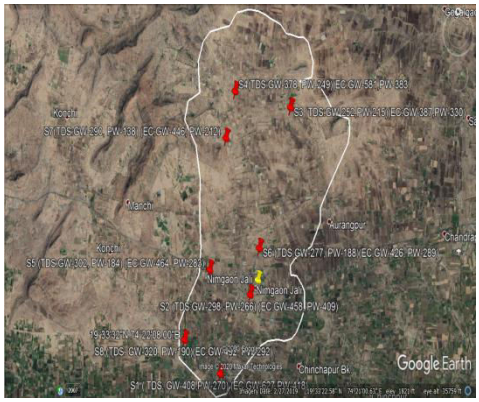
2. STUDY AREA

The NimgaonJali village is located in Sangamner Tahashil of Ahmednagar District in Maharashtra state. It covers an area of 22.5 square kilometer and is included in the Toposheet no. 47 I/6 of the Survey of India and lies between 19° 32'12" to 19° 36'52" N latitude and74° 22' 15" to 74° 24' 18" E longitude

The climate of the study area is generally dry. The maximum temperature during summer is high as 42 °C and the minimum is as low as 10 °C during winter. The area gets rainfall mainly from the south west monsoon with an annual average of 600 mm. The study area is rural and till most part of the village is not received any modern water supply scheme from local body or state government. Therefore, for drinking water the population of study area is mainly depend on their own well or bore well. Hence, the population from the area is threatened regarding quality of water especially for TDS effect. To avoid this, most of the population is using Water purifier in their home for drinking water. In light of these general observations, present study was conducted to investigate quality of purified and raw water for drinking purpose with special reference to TDS and EC in NimgaonJali Village.

3. MATERIAL AND METHOD

In order to get reliable data on TDS and EC in water quality investigation, the important point was considered in present work was; the methods to employ; the purpose of study and the data needed. Accordingly, field and laboratory methods were adopted in this work to fulfill objectives. In all eight sample(S1 to S8) of raw water each (inlet in water purifier) and eight sample of same purified water (water from water purifier i.e. outlet for drinking) was collected simultaneously from village (Map.1) once in the month of October and December, 2019.



Map 1: Showing sampling station in the study area.

Collected sample were filtered and analyzed for TDS and EC in the laboratory as per method given in APHA and AWWA, (1975) and Trivedy and Goel, (1986). The average results obtained after analyses are presented in Table 1.

Table 1: Showing TDS and EC of raw (inlet) and purified (outlet) water samples in NimgaonJali Village, District Ahmednagar.

Sampling station	Raw (inlet) water		Purified (outlet) water	
	TDS (ppm)	EC(µS/cm)	TDS (ppm)	EC(µS/cm)
S1	408	627	270	410
S2	298	458	266	409
S3	252	387	215	330
S4	378	581	249	383
S5	302	464	184	283
S6	277	426	188	289
S7	290	446	138	212
S8	320	492	190	292

4. RESULT AND DISCUSSION

It is observed from Table 1 that raw i.e. inlet water in water purifier shows the TDS ranging from 252 to 408 ppm in study area. The higher concentration of TDS (408 ppm) at S1 sampling station may be due to dissolution of salt from rock as primary source (USDA, 1954; Raymahashay, 1986) and form agriculture run off in the area (Daji, 1985). Similarly, EC ranges from 387 to 627 µS/cm shows linear relation with TDS in area (Anna F Rusydi, 2019). It is seen that the water quality in terms TDS and EC is excellent to good in all sampling stations (Rubait Islam, 2017). However, purified (outlet) water (Table 1) shows TDS ranges from 138 (S7) to 270 ppm (S1). The low concentration of TDS in purified water in the study area may pose human health because of its flat, insipid taste; it also corrosive in nature as it lowers the pH of water (Rubiat Islam et.al. 2017). Literature survey (Sana Akram and Fuzal-ur-Rehman, 2018; Rubait Islam et.al., 2017) reveals that prolonged consumption of high TDS and excess salts like calcium, magnesium water may cause kidney stone formation; it may taste bitter, salty or metallic and may have unpleasant odors. High TDS interferes with the taste of foods and beverages and make them less desirable to consume. Some of the individual mineral salts that make up TDS pose a variety of health hazards. The most problematic are nitrates sodium, sulfates, barium, cadmium, copper and fluoride. Even, water with extremely low concentration of TDS may also be unacceptable to human health; because of its flat, insipid taste; it also corrosive in nature as it lowers the pH of water (Rubiat Islam et.al. 2017). Therefore, drinking water should have optimum quantity of TDS and hence EC. No doubt that the TDS controls the homeostatic, but if it is not maintain in body i.e. glucose concentration, calcium level, magnesium level, fluid volume, body temperature, acid-base balance then it affects on other body functions. It is apparent that disease, physiological or major nutritional deficiencies may cause a leaching problem also (Sana Akram and Fazal-ur- Reheman, 2018). Hence, the palatability of drinking water has been rated by panels of tasters in relation to its TDS level as follows: excellent, less than 300; good, between 300 and 600; fair, between 600 to 900; poor, between 900 to 1200 and unacceptable, more than 1200 ppm respectively (Bruvold and Ongerth, 1969). Hence, population in the study area should adjust their purifier for optimum concentration of TDS to avoid any health problem.

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