European Journal of Molecular & Clinical Medicine
ISSN 2515-8260 Volume 7, Issue 9, 2020

PHYSICOCHEMICAL ANALYSIS OF DRINKING WATER FROM NAGOTHANE TOWN, DIST.RAIGAD(M.S.), INDIA.

V. R. Jadhavar
Assist. Professor in Chemistry
K.E.S. Anandibai Pradhan Science College, Nagothane,
Dist. Raigad, 402106, (Maharashtra), India.

Email-vilasjadhavar1974@gmail.com

Abstract:

Physico-chemical characteristics of the water samples from the study area were analyzed by following the standard methods to determine the quality of drinking water from three types of sample viaRaw water, Tap water andWater after treatment at the Nagothane town from June 2019 to January 2020. The average values of the parameters like pH, Turbidity, Conductivity, Dissolved Oxygen, Total Dissolved Solids, Total Hardness, Chloride, etc. were found within permissible limits for drinking water as prescribed by WHO especially for tap and after treatment water. However, the values observed in raw water samples were above the permissible limits. Therefore it may give severe health problems to the people residing in the study area and was found unsuitable for direct human consumption without treatment. Therefore, the present study states that there is an urgent need for a regular monitoring of water quality, so that further pollution of water can be prevented

Keywords: Drinking water quality, Nagothane town, Water treatment, Raw water.

Introduction:

Hydro-infrastructure is needed to match water demands with availability, to provide reliable, adequate and good quality of water for drinking purpose, for municipal and industrial uses, to irrigate crops, to generate energy and to provide safety against disasters. At the same time, it is also important to protect the environment, realize the benefits from ecosystem services and maintain the biodiversity.Now a day, our country is facing a serious problem of natural resource scarcity, mainly due to population growth and economic development. Most of fresh water bodies all over the world are getting polluted, thus decreasing the potability of water. All life on the earth is depending on water and water exists in nature in many forms like ocean, river,

lake, clouds, rain, snow and fog etc. However, strictly speaking chemically pure water does not exist for any appreciable length of time in nature (Gordeand Jadhav.,2013).

The people who consume raw water can show the symptoms of epidemic diseases. The incidents of epidemic diseases are observed more in Nagothane (PHC reports). There are various causes for these diseases, but the use of water for drinking without treatment may be one among them.Therefore, adequate attention should be given to this source of water. It becomes imperative that the water meant for human consumption should be free of diseases causing due to germs and toxic chemicals that pose a threat to public health. Hence the objective of the present study is to determine selected physical and chemical parameters to check the quality of water in the study area.

Materials and methods:

Study area:

Nagothane is located at 18.53°N 73.13°E. It has an average elevation of 12 metres (39 feet).

This village is prettily situated in a hollow surrounded by wooded hills, on the right bank of the Ambariver. Between Nagothane and the mouth of the Amba, the creek varies from an eighth to three quarters of a mile in breadth. In the fair season there is a considerable traffic at Nagothane, chiefly the export of rice and the import of salt and fishes. Here it's usually hot and humid in the summers and it experiences very heavy rainfall with thunderstorm during the monsoon season amounting up to 90 inches rainfall per year. Besides it is an industrial area with companies of petrochemical, steel industries amounting employment opportunities to a great extent. It is situated about 100 km away from Mumbai and is on the Mumbai-Goa national highway 17(https://en.wikipedia.org/wiki/Nagothana).

Sampling:

Three types of water samples via Raw water, Tap water and Water after treatment at the Nagothane town during June 2019 to January 2020 were collected in clean sterilized plastic cans of one liter capacity and analyzed for a some of the physico-chemical parameters like pH, Turbidity, Conductivity, Dissolved Oxygen, Total Dissolved Solids, Total Hardness, Chloride, etc.by using prescribed method from APHA. AWWA (1998) and Trivediand Goel (1986).The obtained results were compared to the Beauro of Indian Standards (BIS) and World Health Organization (WHO) water quality standards.

Results and Discussion:

Table: Average physico-chemical values of three types of water samples at Nagothane duringJune 2019 to January 2020.

Parameters	Raw water	Tap water	Water after treatment	WHO standard values
pH	7.82	6.12	7.40	6.5-8.5
Turbidity	12.22	9.20	1.31	5 NTU
Conductivity (μs/cm)	1120	1025	952	900
Dissolved oxygen	4.92	5.23	7.21	4-5
Total dissolved solids	825	715	578	300-600 mg/lit
Total Hardness	62.22	64.32	60.15	500 mg/lit
Chlorides	225	246	238	250 mg/lit

Fig.No.1 Variation in the values of pH, Turbidity and Dissolved Oxygen of three water samples

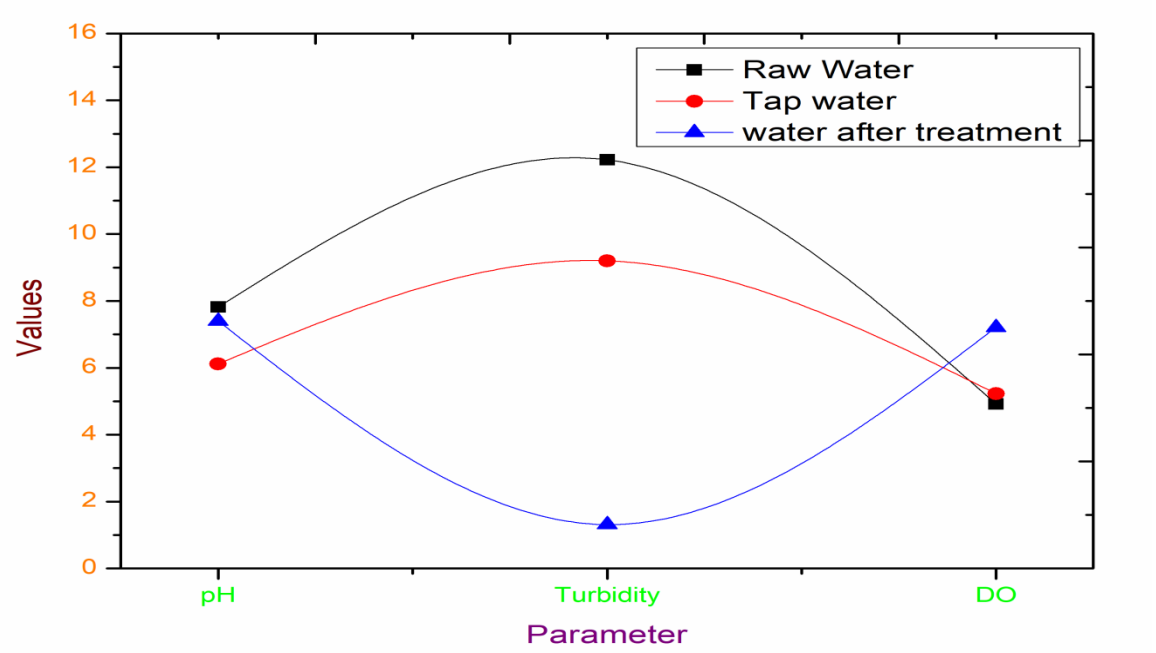
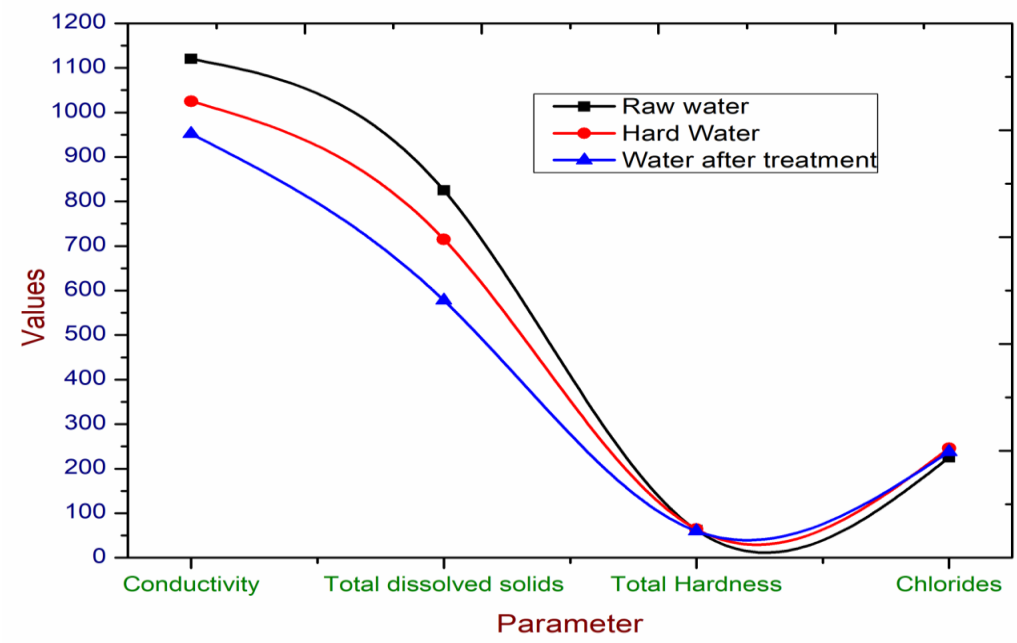


Fig.No.2 Variation in the values of Conductivity, TDS,TH and Chlorides of three water samples with their WHO standards.



1.pH: The pH of water is a reflection of the degree of acidity (pH lower than 7) or alkalinity (pH greater than 7). The fact is that the pH of most unpolluted water lies between 6.5 and 8.5 pH is an important operational water quality parameter (WHO, 2011). The taste of water, its corrosiveness and solubility and speciation of metal ions are all influenced by pH. At low pH, water may taste sour, while at high pH water taste as bitter or soapy (DWA, 2006). The pH values didn't show fluctuations over the study period. In the study area, the average of pH on the sampling sites was found between 6.12 and 7.82 (Fig.No.1). The maximum pH value, 7.82, was recorded in the sample of raw water. The pH values in all the water samples were observed within the slight alkaline range.

The pH value is affected due to the organic and inorganic pollutants present in water. Any alteration in water pH is accompanied by the change in other physicochemical parameters. pH maintenance is one of the most important attributes of any aquatic system since all biochemical activities depend on surrounding water pH. Maximum values of pH of raw water may be due to the increased in photosynthesis process of the algal blooms resulting into the precipitation of calcium and magnesium carbonates from bicarbonates causing higher alkalinity(Omar Elahcene, *et al*., 2019).

2.Turbidity: Turbidity in water is due to suspended and colloidal matter such as clay, silt, finely divided organic and inorganic matter, plankton and other microscopic organisms (Roopavathi*et al.,* 2016). The turbidity of the samples lies between 1.31 NTU to 12.22 NTU in the study area(Fig.No.1). Maximum permissible limit of turbidity in drinking water is 5 NTU as suggested by WHO (2004), only raw water and Water before treatment samples exceed this limit.

3.Conductivity: Conductivity is the electrical property of water, and depends on the ions present in the water, their concentration, mobility and the charge, as well as of the temperature at which the conductivity is measured. The minimum conductivity was measured in the sample of water after treatment as 952μS cm-1 and the maximum in the sample of raw water as 1120 μS cm-1(Fig.No.2). The obtained values were found above the standard values (WHO, 2004). This measures the ability of water to conduct electricity which depends on the concentration of dissolved substances and temperature (Taiwo*et al.,* 2012, Roopavathi*et al.,* 2016).

4.Dissolved Oxygen:DO concentration is one of the most important parameter to indicate water purity. The importance of DO in aquatic ecosystem brings out various biochemical changes and

it influence metabolic activities of organisms. In this analysis, the DO was observed as 4.92 for raw water sample which is slightly below the limits as per the standards given by WHO(Fig.No.1). However the values 5.23 for the sample of tap water and 7.21 for the sample of water after treatmentwere high as per the limits prescribed by WHO.

The quantity of DO in water is directly or indirectly dependent on water temperature, partial pressure of air. Similar results were observed by Gulumbe*et al.* (2016) who reported that DO in water is largely dependent on important environmental factors like the temperature.

5. Total Dissolved Solids: The level of TDS decides the quality of drinking water and since it is an important factor to aquatic life in keeping the cell density balanced. The TDS values for the three different types of water samples were observed as 825,715 and 578 mg/lit for raw water, tap water and water after treatment respectively(Fig.No.2). It clearly indicates that raw water and tap water is not suitable for drinking purposes.

Water with high TDS has normally affected the taste and causes the high alkalinity or hardness. The TDS concentration is a secondary drinking water standard, therefore, it should be regulated otherwise it may give health problems.These high values may be due to ground water pollution by waste waters which may originate naturally or introduced through human activities (Taiwo*et al.,* 2012).

6.Total Hardness: The total hardness of the three samples were observed as 62.22,64.32 and 60.15 mg/l for raw water, tap water and water after treatment respectively, while WHO standards permits any value less than 500mg/lit.(Fig.No.2).In all three samples of a study area, the total hardness were found not exceeded and beyond the maximum permissible limit.The hardness of water is due to dissolved calcium and magnesium salts from soil and aquifer minerals containing limestone or dolomite (Roopavathi*et al.,* 2016).

7.Chlorides: The Chloride values for three types of water sample were observed as, 225,246 and 238 mg/lit for raw water, tap water and water after treatment respectively(Fig.No.2). It clearly indicates thatall these values were below the limit prescribed by WHO. Although these values are not high, but it is an indicator of pollution due to organic waste of animal origin(Omar Elahcene, *et al*., 2019).

Conclusion:

The present work is an attempt to identify and assess different sources of contamination to drinking water. The physico-chemical analysis indicates the present status of raw water, tap water and water after treatment fordrinking purpose. The values ofsome physico-chemical parameters falls within the standard limits of WHO standards. However, the Raw water and Tap water has been contaminated by certain pollutants and anthropogenic activities in the study area and so that both the types of water is not suitable for drinking purposes. Hence,water sources must be protected from contamination by human activities in the study area. Therefore there isan urgent need for a regular monitoring of water quality, so that further pollution of water can beprevented and will be useful to reduce the acute or chronic types of water related diseases, which are endemic to the people residing into this area.

References:

1.APHA, AWWA (1998): Standard methods for the examination of water and waste water (20th edn.), American Public Health Association, Washington D. C., pp.1-586.

2. BIS (1991): Specifications for drinking water IS: 10500:1991. Bureau of Indian Standards, New Delhi.

3.Gorde S.P. and Jadhav M.V., (2013):Assessment of Water Quality Parameters: A Review, Int. Journal of Engineering Research and Applications, ISSN : 2248-9622, Vol. 3, Issue 6, Nov-Dec 2013, pp.2029-2035

4.Google site-https://en.wikipedia.org/wiki/Nagothana

5.Gulumbe, B. H.; Aliyu, B. and Manga, S. S. (2016). Bacteriological and Physicoch-emical Analyses of Aliero Dam Water. International Journal of Inno-vative Studies in Sciences and Engineering Technology (IJISSET). Vol.2 (4),pp.30-43.

6.DWA (Department of Water Affairs) (2006). A Drinking Water Quality Framework for South Africa. Government Printer, Pretoria, South Africa,pp.104

7.Omar Elahcene; HodaAbd El-Azim and AziouzAidoud (2019): Physico-chemical and bacteriological analysis of water quality in different types of water from the Ain Zada Dam of BordjBouArreridj (Algeria), Egyptian Journal of Aquatic Biology & Fisheries Zoology Department, Faculty of Science, Ain Shams University, Cairo, Egypt., ISSN 1110 – 6131,Vol. 23(3), pp.423-439

8.Roopavathi, C.; Mamatha, S. S. and N. S. Raju (2016). Assessment of physicochemical and bacteriological drinking water quality of different sources of H.D. Kote town, Mysore district. Int. Journal of Engineering Research and Application.Vol.6(7),pp.45-51

9.Taiwo, A.A.; Ijaola, T.O.; Jiboku, O.; Oluwadare, I. and Osunkiyesi, A. (2012): Physicochemical and Bacteriological Analyses of Well Water in Abeokuta Metropolis, Ogun - State, Nigeria.IOSR Journal of Applied Chemistry (IOSR-JAC);Vol. 2(6),pp29-35.

10.Trivedy, R.K. and P.K. Goel (1986): Chemical and biological methods for water pollution studies, Environ. Publ., Karad, India, pp. 35-96.

11.WorldHealth Organization WHO (2004):Safe Piped Water: Managing Microbial Water Quality in Piped Distribution Systems. Edited by Richard Ainsworth. ISBN: 1 84339 039 6. Published by IWA Publishing, London, UK.

12.World Health Organization WHO (2011):Guidelines for Drinking Water Quality, Genève: WHO. Press,4th Ed.