

# Analysis of Physiochemical Parameters to Evaluate the Drinking Water Quality in Winter and Summer Season in Vanjipatti Village in Tamilnadu

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**Abstract:-** The safety and cleanliness of water is an absolute need for a healthy and productive life. The water quality supplied is important in determining the health of living individuals and communities. The study aimed to assess and compare the quality of water present in the village named "Vanjipatti" of Madurai District with Indian Standards and its health hazards in that territory. Two water samples were collected from two different seasons of winter and summer respectively. The samples were collected in plastic water cans of 5 liters of capacity. Data collection was done based on the questionnaire and laboratory analysis of water samples. Certain physical and chemical parameters like total dissolved solids (TDS), electrical conductivity (EC), pH, hardness, alkalinity, etc., were examined to find out the quality of water source. Findings revealed that water quality in Vanjipatti is unadulterated and clear. The water has pure white colour without contamination and tastes sweet. The analysis of parameters in the laboratory revealed the important contamination in ground water. EC, TDS, hardness, pH etc. were equitably minimum within IS permissible limits. Such better quality of water reasoned to safety against waterborne diseases like diarrhea, cholera etc. The results showed pH value of 7.05-7.03, hardness range of 11.5-12mg/l from physiochemical analysis of water samples which were within Bureau of Indian Standards and WHO standards. The study also found that the Sodium and Potassium contents which were major problem with drinking water were also equal to null. To save the local residents, study suggests regular monitoring of water quality should be practiced and water should be boiled and cooled to provide safe drinking water.

**Keywords:-** Water quality, Physiochemical Parameters, BIS, Potable.

## I. INTRODUCTION

Water is the most vital liquid for maintaining life on earth. Out of the 100% of water available on Earth, about 97% is found in oceans which is not fit to be used for drinking purpose due to the high saline concentration. The rest 3% of water is available as fresh source of water with little or no saline concentration. The 2.97% in fresh water is made up of ice caps and glaciers. The remaining 0.3% of it

is available on surface and under the ground which serves useful for humans. Humans should be equipped with safe and pure drinking water as it is the fundamental need for living healthy. With increase in population, changes in climatic conditions and urbanization, the demand for fresh water is in constant increasing rate creating a threat for scarcity. Regrettably, in developing countries like India the drinking quality of water is continuously being contaminated and hazardous for human use due to high growth of population, expansion in industries, hurling away of wastewater and chemical discharge into ducts and other water bodies. As per the recent estimates, the quantity of water which is available in developing regions of South Asia, Middle East and Africa is decreasing keenly while quality of water is declining swiftly due to rapid urbanization, deforestation, land degradation etc. Contaminated drinking water causes many diseases such as diarrhea, vomiting, gastroenteritis, dysentery, kidney problems etc. In modern years, swiftly increasing population and economic, educational developments of the cities have brought a huge pressure on natural resources which includes water present below the ground, cultivable land, etc., Drinking water quality grades describe the quality parameters set for drinking water. Despite the fact that every human individual on Earth needs drinking water to live and if such water may contain many detrimental constituents, there is no universally acknowledged and accepted international standards for drinking water. Even in cases where standards exist, and are put in, the permitted levels of individual constituents may differ by as much as ten times from one set of standards to the other.

## II. STUDY AREA

Vanjipatti is a small hamlet in Kottampatti Block in the district of Madurai, State of Tamil Nadu, India. It comes under Karungalakudi Panchayath. This hamlet is located 46 km towards East from Madurai District headquarters, 3 km from Kottampatti, and 445 km from the State capital Chennai with a population of about 300 families. The nearby Villages to Vanjipatti are Kodukkampatti, Ayyapatti, Kambur, Kottampatti and Pattur. It is surrounded by Nattam Block towards west, Melur Bl Natham, Thirupuvanam, Sivaganga, Madurai. This Place lies in the border of the Districts of Madurai and Sivaganga. Singampunari at Sivagangai District is east towards this place. It also lies in the Border of other district

of Pudukkottai. There is a naturally stagning water source occurring above the hills of the VANJIPATTI. It is a unknown fact about the source of this water level. The Latitude and Longitude of the site are 10.161064°N and 78.387052°E respectively.



Fig 1:- Water source

The panchayat and municipal officials were placed a tap water facility to each houses of the village. And there is a water tank for common domestic uses. The water is used only for the drinking purposes. And the locality people are aware of not to contaminate it. By the reports and hearing, people says that till now there is no disease spreads due to the water level. And they are also cautious to boil the water and to drink. Since the water tastes sweet, the majority of the people were using it for drinking and the rest of higher class people uses the can water.

The water source is bounded with the compound wall by those community to avoid animals, insects and cattle invasions. But it is our responsibility to test the quality of the water in case of amount of various salts, chemicals, gases to be present in drinking water.

So this water quality assessment will be decorous for those community in aware of safe drinking purpose.

### III. METHODOLOGY

#### A. Sample Collection

We have arrived to project site on two different seasons of winter and summer respectively. Samples were collected between the months of December to January and February to March. Samples were collected in plastic water cans of 5 litres capacity.



Fig 2:- Water sample collection

#### B. Water Quality Assessment

The water quality is been assessed by two important parameters they are:

##### ➤ Physical parameters

The Physical analysis include, temperature, colour, turbidity, odour and taste which indicate the sanitary quality of water for the consumption of human beings.

##### ➤ Chemical parameters

The chemical analysis include total alkalinity, total hardness, calcium, magnesium, total iron, sodium, potassium, free ammonia, nitrite, nitrate, chloride, fluoride, sulphate, phosphate, TDS, biological oxygen demand, dissolved oxygen. Bacteriological analysis includes faecal coliform test to detect the presence of coliform bacteria, which indicate the sanitary quality of water for the consumption of human being.

## IV. RESULTS AND DISCUSSION

#### A. Physical Parameters:

##### ➤ Temperature

Water temperature differs gradually in response to changes of seasons. Small bodies of water will be affected by air temperature faster than larger bodies of water. Seasonal variations in the temperature of water may be caused by changing air temperature.

##### ➤ Electrical Conductivity

Electrical Conductivity (EC) is the concentration of amount of ions or minerals which are dissolved in water. It shows the expected chances of water adulteration. The highest and lowest concentration of Electrical Conductivity was observed as 0.1 and 4.5 respectively.

##### ➤ Colour

Water usually appears as a colorless liquid however it possesses some level of color. Color in ground water can originate from the degradation of biological matter and escape through sewage. The test result stated that the water is colorless.

##### ➤ Turbidity

Measurement of Turbidity ranged from 2.31 to 2.56 NTU. Conversely the recommended limit of Turbidity for drinking water is 5 NTU (as per IS: 10500). Turbidity was found within the permissible limit in all the water samples.

##### ➤ Taste

Water may taste in many different ways. The taste of water is generally categorized in three groups as sweet, medium and brackish. The taste in water can be detected to a number of factors including degrading organic matter, living organisms, iron, mixing industrial waste etc. The test result stated that the water is tasteless.

##### ➤ Odour

Smell of the water in the study was classified into three categories of slight smell, no smell, and fast smell. The test result stated that the water has no smell.

**B. Chemical Parameters:**➤ *pH*

In the present study, the fluctuation of pH in the samples is from 7.1 to 7.05. It is found that the pH of the water sample are within the permissible limit as per BIS

➤ *Total Dissolved Solids*

In the study, TDS varied from 145 to 175 mg/l. As prescribed limit of TDS for drinking water is 500 mg/l, all the water samples have TDS concentration well below the prescribed limit.

➤ *Total Hardness*

Based on present investigation, hardness varied from 40.2 to 45.2mg/l. However the permissible limit of Hardness for drinking water is 600 mg/l.

➤ *Biochemical Oxygen Demand(BOD)*

The low BOD value in all samples showed good sanitary condition of the water. It is found that all the water sample is within the permissible limit (i.e., 3 to 4 mg/l).

➤ *Dissolved Oxygen(DO)*

DO is ranged from 8.61 to 8.96 mg/l in the sample, whereas the prescribed limit for DO is 5.0 mg/l.

➤ *Alkalinity*

In the present study Phenolphthalein Alkalinity was absent in all samples and Methyl Orange Alkalinity was ranged from 8 mg/l to 10 mg/l, this indicates the absence of Hydroxyl and Carbonate and presence of Bicarbonate. However the prescribed limit for Total Alkalinity is 200 mg/l.

➤ *Chloride*

In the study area there is no significant change in chloride concentration and it ranged from 5 to 6 mg/l Chloride which have been associated with pollution as an index are found below the permissible value set at 250 mg/l in most of the study.

**V. CONCLUSION**

The water samples that had been collected in two seasons of summer and winter were thoroughly tested and a comparative study for the same was made. From the results obtained from the tests of water samples, it can be suggested that the water available in the source comes under the category of Soft Water and hence be potable for the purpose of drinking. The tests were carried out and the samples were treated to attain the satisfaction of Indian Standards. The quality of water in both seasons varied slightly which can be inferred from the presence of different parameters in water such as pH, Turbidity, Total Hardness, Total Dissolved Solids, Chloride content and Alkalinity in respective seasons. The values obtained in the results of testing the water samples seemed to be similar to that of rain water. From this, it can be concluded that the source from which the samples were collected might be suggested to be water from Rain.

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