Government degree college,shadnagar

R.R-Dist

Project work

on

Impact Of pH, TDS And Fluoride Level of Drinking Water In

Shadnagar and Surrounding Villages

Submitted by

Group (B.Z.C STUDENTS)

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Certificate

This is to certify that B.Sc (BZC),(MPC) SEM V,III,I students has successfully completed a Study Project on **"IMPACT OF PH ,TDS AND FLORIDE LEVELOF DRINKING WATER IN SHADNAGAR AND SURROUNDING VILLAGES "** for the academic year 2021-22 under the Supervision of **Dr M.SRILATHA DEPARTMENT OF CHEMISTRY.**

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Hence it is certified

PRINCIPAL
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Shadnagar.
Ranga Reddy Dist.

Principal

AKNOWLEDGEMENT

It gives us immense pleasure to submit our research entitled "**Impact Of pH, TDS And Fluoride Level of Drinking Water In Shadnagar and Surrounding Villages**" submitted for the Students' Study Project, which is not an end but a beginning for all those who are keen and enthusiastic to carry out similar studies for developing interest inresearch field.. We are fortunate to have the support and encouragement from the Principal G.Bhanu Prakash sir,and our Mentor Dr M.Srilatha We have no words to express our gratitude towards their humbleness and valuable contributions.Our thanks to all the other Intellectuals, Academicians, Scholars, Professionals, and a large number of Faculty and Students, who came in our contact during the period of research and directly or indirectly made academic or intellectual contributions towards enrichment of our project work.

B.Sc(M.P.C,B.Z.C)

IMPACT OF PH ,TDS AND FLORIDE LEVELOF DRINKING WATER IN SHADNAGAR AND SURROUNDING VILLAGES

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Impact Of pH, TDS And Fluoride Level of Drinking Water In

Shadnagar and Surrounding Villages

Introduction

Although fluorine is an essential element for human growth and development, its intake in excessive amounts beyond the permissible limits can be very harmful. Dental and skeletal fluorosis are some of the common afflictions of fluorine poisoning and it can even have 'crippling effects' in aged individuals. With the rise in industrialization fluoride contamination is increasing in the human environment as it is a basic component of the ground water. According to the World Health Organization, the maximum acceptable concentration of fluoride ions in drinking water is 1.5 mg/l to prevent tooth and bone problems Fluoride in excess of 1.0 mg per litre causes dental fluorosis if ingested regularly. It can also result in skeletal fluorosis and non-skeletal manifestations i.e. loss of appetite, joint pain, stiffness of neck and back pain, gas formation, laziness in routine life, increased urination etc, as commonly reported in fluorotic regions Certain regions of India, particularly the arid zones of shadnagar, have serious fluoride problems and it has become a serious health hazard in several villages of shadnagar. affected, the number of villages, blocks, districts and states endemic for fluorosis have been steadily increasing ever since the disease was discovered in India during 1930s. The reason for the increase in the disease incidence and the sizeable number of locations being identified as endemic zones for fluorosis is due to overgrowth of population, necessitating more and more water, indiscriminate digging of tube wells, resorting to the use of hand pump water, unawareness regardingtheimportance of checkingwaterquality,especiallyforfluorideandduetowatershortage.

The available data suggest that 15 states in India are endemic for fluorosis (fluoride level in drinking water >1.5 mg/l), and about 62 million people in India suffer from dental, skeletal and non-skeletal fluorosis. Out of these, six million are children below the age of 14 years. shadnagar consists of areas with various levels of fluoride in drinking water, starting from below-optimum to optimum and above-optimum levels. People who consume groundwater have higher chances of developing dental fluorosis because of higher level of fluoride in deep groundwater of the city as reported by the water department of Mahabubnagardistrict.

AGENT FATORS:

pH in terms of alkalinity of water promotes the absorption of Fluoride.

Calcium in the diet reduces the absorption of F Fluoride, Hard water rich in Calcium reducesthe Fluoride toxicity.

Fresh Fruits and Vit. C reduces the effect of Fluoride.

Trace elements like Molebdenum enhances the effect of Fluoride.

Host Factors

- In School going children seen as dental fluorosis.
- In third and fourth decade of life seen as SkeletalFluorosis.
- Males suffer more than females.Migration influences the occurrence depending onwhich way people migrate.
- Illiterates suffer more frequently in the fluorotic belts.
- Where aluminium ores are mined, it is seen as occupational health hazard..

Environmental Factors

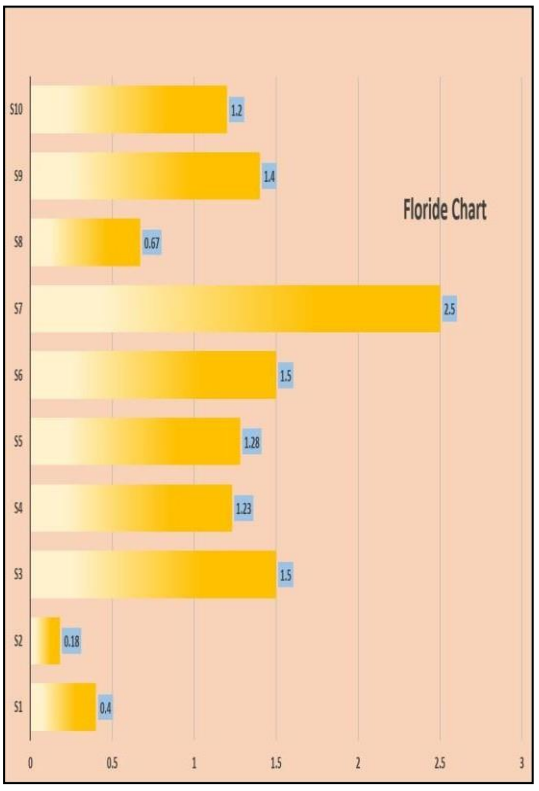
- High Annual Mean Temperature
- Low Rainfall
- Low humidity
- F rich Natural subsoil rocks
- Vegetables from high F belts
- Fluoridated tooth paste particularly when usedby children
- Tropical climate
- Developing Countries Sources of fluoride for human exposure

Main sources of fluoride

- Water
- Food
- Air
- Medicament
- Cosmetic

Factors Affecting Development of Fluorosis

- Concentration of fluoride in drinking water (morethan 1.5 mg/ L), food, cosmetics etc.
- Low calcium and high alkalinity of drinking water promotes the absorption of F.
- Age



Concentration	Impact of Health
0.0-0.5	Limited growth and fertility ,dental caries
0.5-1.5	Promotes dental health,prevents tooth decay
1.5-4.0	Dental flurosis(mottling of teeth)
4-10	Dental fluorosis skeletal fluorosis
>10.0	Crippling fluorois

Table1: Concentration of Impact on Health Fluoride (mg/L)

Methodology

The root cause of fluorosis is the extensive. Fluoride may be presence due to breakdown of rocks and soils or infilteration of chemical fertilizers from agriculture land. Theroot cause of fluorosis is the extensive use of borewells. Earlier, the major source of water in the district was open wells or lakes. But in the last two decadecade, people have been diggingbore wells which have penetrated the sub-surface levels. Were there is a high fluoridecontent. Over the years there have been several scheme that were launched to tackle the issue,but they fizzled out very soon

WORKING PRINCIPLE OF DR/850:

We used the DR/850 portable colorimeter combine ease of use with high testing capabilities. It is a high value, high capability field instrument for water quality analysis. Itis designed specifically for the on-site testing with rugged components and water proof, dust proof chemical resistant housing. First we will do this experiment by taking blank solution (distil water). By adding 2 ml of spadn's reagent (fluoride ion indicator) now the reading becomes zero. Then take the solution which we want to analysis add 2 ml ofspadn's fluoride reagent. We will get reading.

S.No	VILLAGE	FLORIDE (mg/lit)	TDS (mg/lit)	PH
1	GURRAMPALLI	0.4	527	6.3
2	CHOKKAMPET(MISSION BAGIRATHA)	0.18	177	6.5
3	CHOWDARPALLI	1.5	296	62
4	CHOWDUPALLI	1.23	414	6.83
5	MAKTHAMANDARAM (GROUND WATER)	1.28	138	8
6	MAKTHAMANDARAM (R.O)	1.5	280	7.5
7	CHALIVENDRAMPALLI	2.5	579	6.5
8	SHADNAGAR(R.O WATER)	0.57	40	7.3
9	CHALIVENDRAMPALLI	1.4	270	6.93
10	NANDIGAMA	1.2	256	7

Total Dissolved Solids (TDS):

TDS stands for total dissolved solids, and represents the total concentration of dissolved substances in water. TDS is made up of inorganic salts, as well as a small amount of organic matter. Common inorganic salts that can be found in water include calcium, magnesium, potassium and sodium, which are all cations, and carbonates, nitrates, bicarbonates, chlorides and sulfates, which are all anions. Cations are positively charged ions and anions are negatively charged ions. is a measure of the dissolved combined content of all inorganic and organic substances contained in a liquid in molecular, ionized or micro- granular (colloidal sol) suspended form. Generally the operational definition is that the solids must be small enough to survive filtration through a filter with two-micrometer (nominal size,or smaller) pores. Total dissolved solids are normally discussed only for freshwater systems, as salinity includes some of the ions constituting the definition of TDS. The principal application of TDS is in the study of water quality for streams, rivers and lakes, althoughTDS is not generally considered a primary pollutant (e.g. it is not deemed to be associated with health effects) it is used as an indication of aesthetic characteristics of drinking waterand as an aggregate indicator of the presence of a broad array of chemical contaminants.

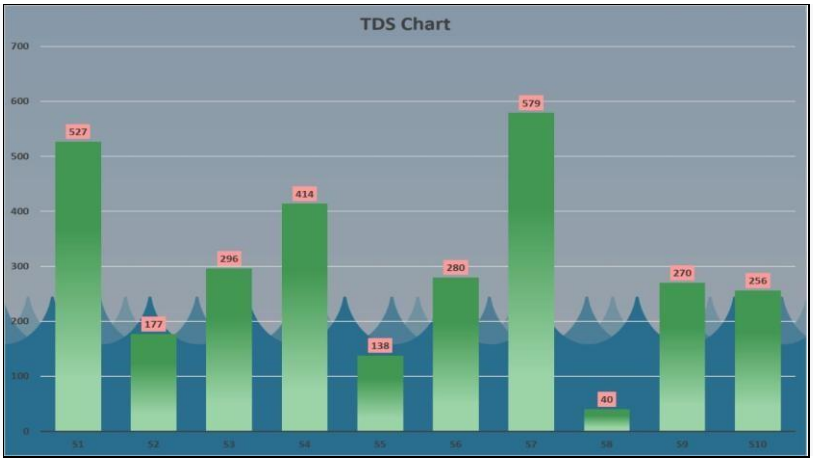
Primary sources for TDS in receiving waters are agricultural and residential runoff, clay rich mountain waters, leaching of soil contamination and point source water pollution discharge from industrial or sewage treatment plants. The most common chemical constituents are calcium, phosphates, nitrates, sodium, potassium and chloride, which are found in nutrient runoff, general storm water runoff and runoff from snowy climates where road de-icing salts are applied. The chemicals may be cations, anions, molecules or agglomerations on the order of one thousand or fewer molecules, so long as a soluble micro- granule is formed. More exotic and harmful elements of TDS are pesticides arising

from surface runoff. Certain naturally occurring total dissolved solids arise from the weathering and dissolution of rocks and soils. The United States has established a secondary water quality standard of 500 mg/l to provide for palatability of drinking water.

Total dissolved solids are differentiated from total suspended solids (**TSS**), in that the latter cannot pass through a sieve of two micrometers and yet are indefinitely suspended in solution. The term "settleable solids" refers to material of any size that will not remain suspended or dissolved in a holding tank not subject to motion, and excludes both TDS and TSS. Settleable solids may include larger particulate matter or insoluble molecules.

A TDS meter indicates the total dissolved solids (TDS) of a solution, i.e. the concentration of dissolved solid particles. Dissolved ionized solids, such as salts and minerals, increase the electrical conductivity (EC) of a solution. Because it is a volume measure of ionized solids, EC can be used to estimate TDS. Dissolved organic solids, such as sugar, and microscopic solid particles, such as colloids, do not significantly affect the conductivity of a solution, and are not taken into account.

The most accurate way to measure all TDS in water in a laboratory is to evaporate the water. Leaving behind dissolved solutes as residue, and then weighing the residue.



Water Classification:

Water can be classified by the level of total dissolved solids (TDS) in the water:

- Fresh water: TDS = 500 ppm
- Brackish water: TDS = 500 - 30,000 ppm
- Saline water: TDS = 30,000 - 40,000 ppm
- Hypersaline: TDS greater than 40,000 ppm

Level of TDS in drinking water:

Different organizations, companies, and government have different regulations for the TDS level. According to World Health Organization, TDS concentration of 1000 mg/ litre is considered acceptable for water consumers but this acceptability factor may change as TDS concentration has a direct impact on the taste of water.

TDS level in mg/litre	Reasons for acceptability/non-acceptance
Less than 50	This is a totally unacceptable level because water with such a low proportion of TDS does not contain the requisite minerals.
50-150	This is an acceptable level however TDS levels In the range of 80-150 is preferable .
150-250	As far as cardiovascular health is concerned this levels of TDS is healthiest
250-350	TDS in this range is acceptable. many places in India have this level of TDS
350-500	Any level below 500 mg/lit is acceptable for drinking
Less than 300	This level is considered excellent to drink
300-500	These levels are good
Above 500	This is an unacceptable range

pH Meter

The pH value of a water source is a measure of its acidity or alkalinity. The pH level is a measurement of the activity of the hydrogen atom, because the hydrogen activity is a good representation of the acidity or alkalinity of the water. The pH scale, as shown below, ranges from 0 to 14, with 7.0 being neutral. Water with a low pH is said to be acidic, and water with a high pH is basic, or alkaline. Pure water would have a pH of 7.0, but water sources and precipitation tends to be slightly acidic, due to contaminants that are in the water.

A pH meter is a scientific instrument that measures the hydrogen-ion activity in water-based solutions, indicating its acidity or alkalinity expressed as pH. The pH meter measures the difference in electrical potential between a pH electrode and a reference electrode, and so the pH meter is sometimes referred to as a "potentiometric pH meter". The difference in electrical potential relates to the acidity or pH of the solution. The pH meter is used in many applications ranging from laboratory experimentation to quality control.

Applications

The rate and outcome of chemical reactions taking place in water often depends on the acidity of the water, and it is therefore useful to know the acidity of the water, typically measured by means of a pH meter. Knowledge of pH is useful or critical in many situations, including chemical laboratory analyses. pH meters are used for soil measurementsin agriculture, water quality for municipal water supplies, swimming pools, environmental remediation; brewing of wine or beer; manufacturing, healthcare and clinical applicationssuch as blood chemistry; and many other applications.

Advances in the instrumentation and in detection have expanded the number of applications in which pH measurements can be conducted. The devices have been miniaturized, enabling direct measurement of pH inside of living cells. In addition to measuring the pH of liquids, specially designed electrodes are available to measure the pH of semi-solid substances, such as foods. These have tips suitable for piercing semi-solids, have electrode materials compatible with ingredients in food, and are resistant to clogging.

Types of pH meter

pH meters range from simple and inexpensive pen-like devices to complex and expensive laboratory instruments with computer interfaces and several inputs for indicator and temperature measurements to be entered to adjust for the variation in pH caused by temperature. The output can be digital or analog, and the devices can be battery-powered or rely on line power. Some versions use telemetry to connect the electrodes to the voltmeter display device.

Specialty meters and probes are available for use in special applications, such as harsh environments and biological microenvironments. There are also holographic pH sensors, which allow pH measurement colorimetrically, making

use of the variety of pH indicators that are available. Additionally, there are commercially available pH meters based on solid state electrodes, rather than conventional glass electrodes.

pH Meter

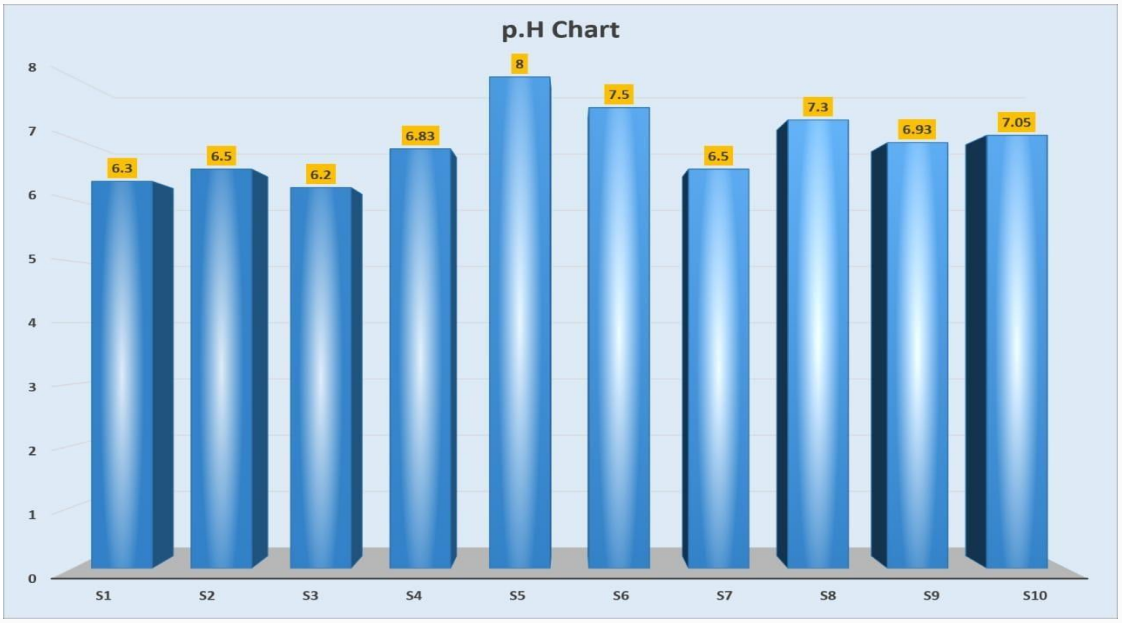
pH Meter and its Applications:

pH is the measure of the level of acidity or alkalinity of any liquid or solution. A specific pH level is to be maintained in all the living organisms so as to sustain in this world. Even blood andwaterhavethedownpHvalues.

pH measurement should be done for all the processes which involve water or soluble compounds. It is done using an electronic instrument, a pH Meter which consists of 3 parts—an electrode that is dipped in the solution to measure the voltage, a display, and a chip or sensortoprocessthepHvalue.

pH is the measurement of hydrogen ion concentration of a liquid, with values ranging from 0-14. These values indicate the level of acidity and alkalinity. Since pH value 7 is the center of the measurement scale, it is neither acidic nor basic and is, therefore, called “neutral".It is very important to understand the pH value of any substance, so that it can be put to effective use. If the pH value of a soil sample is found to be in an optimal range, it is considered to be the most suitable for cultivating wheat and other crops, thus maximizing the yields and returns from the soil. In some situations, the rainwater’s pH was found closer to 0 thanto7.

Thus,thatsamplewasmoreacidic.Maintaining perfect and accurate pH levels helps in several daily activities like keeping the milk from turning sour. Thus, a pH meter plays a significant role in everyday life, even though it is not explicitly used by a common man. pH meters are employed profusely in other diverse fields like chemical industry, water purification processes like reverse osmosis, Hexavalent chromium destruction, electroplating, cyanide destruction, neutralization of effluent in steel, pulp and paper, pharmaceutical manufacturing, biotechnology and petrochemical industries etc. Hence, pH meter helps in analyzing the exact pH value of chemical substances and food grade products, thus ensuring highlevelsofsafetyandquality.



In India, there are several pH meter manufactures who deliver high performance and analytical microprocessor-based pH meters which use latest technology. Before purchasing a pH meter for laboratory or commercial purpose, make sure that you buy from a reputed brandwhich is reliable and meets world class standards. Most of the pH meters which are available in the market have a lesser response time as compared to the traditional pH meters.

A very low concentration of TDS produces undesirable taste of water, as many people buy mineral water, which has natural levels of dissolved solids. Increased concentrations of dissolved solids can also have technical effects pH is one of the most important operational water quality parameters. Careful attention to pH control is necessary to ensure satisfactory water clarification and to avoid the corrosives of water. A very low concentration of TDS has been found to give water a flat taste, which is considered to be unacceptable to many people and same goes the case with increased concentrations of dissolved solids as it produces hard water, leaving deposits and films on fixtures, and on the insides of hot water pipes and household appliances.

CONCLUSION:

As a part of my project work,I have analysed water of **MISSION BAGIRATHA** and other available warer i.e ground water and what I have found after my analysis is that the water of mission bhagiratha has maintained all the parameter that a drinking water ought to maintain like ph,TDS and floride tubidity and uuseful mineral etc.,and where as the ground water is lacking

Our team visited ten villages and collected ground water R.O. water and Mission Bhaghiratha water samples. After examining and analyzing water it has been found that T.D.S. floride pH levels are comparatively high in ground water. Especially in the village

called Chalivendrampally the floride level is high i.e. 2.5. The victim of consuming florosis water could be seen in the village. Most of them have been affected with bones and teeth, malnutrition and less immunity persons are more prone to calcification. For the children and old aged people are also affected with florosis. The effect of florosis can be curbed with Nalgonda technique and heating of drinking water. Advanced treatment technologies reverse osmosis, electro dialysis, distillation and precipitation methods are commonly used for deflorination.

In India scientis ts have developed a method known as Nalgonda technique amount of alum to be mixed with water is calculated. The purification technique used in **Mision Bhaghiratha** is very excellent and if the same water is distributed to the villages where florosis is prevailing, it could drastically lessen florosis effect and other related diseases like kidney problems and water borne diseases.

ELEMENTS OF WATER SUPPLY SCHEME:

The typical elements/components of the water supply scheme are as given below:

Source/Intake:

- Intake structures are used for collecting raw water from the surface sources such as river, lake and reservoir and conveying it further to Water Treatment Plant (WTP). Raw water from a surface water lake or reservoir is drawn into the plant throughintake structures. Large debris like logs are prevented from entering and zebra musselcontrol is performed at the intake.

WTP:

- Water treatment generally consists of three steps i.e. Aeration, Coagulation, Clarification, Filtration and Disinfection.
- Aeration brings water and air in close contact in order to remove dissolved gases (such as carbon dioxide) and oxidizes dissolved metals such as iron, hydrogen sulfide,and volatile organic chemicals (VOCs). Aeration is often the first major process atthe treatment plant.
- In coagulation, we add a chemical such as alum which produces positive charges to neutralize the negative charges on the particles. Then the particles can stick together, forming larger particles which are more easily removed.
- Clarification refers to the separation of particles from the water stream. By slower mixing, turbulence causes the flocculated water to form larger floc particles that become cohesive and increase in mass. This visible floc is kept in suspension until large enough to settle under the influence of gravity.
- Chemical addition destabilizes the particle charges and prepares them for clariflocculation either by settling or floating out of the water stream.
- Disinfection maintains a residual to protect water supply through the supply network. Supplemental chlorine is added to maintain disinfection concentrations while thewater is pumped through the distribution system. The purpose is to ensure minimum residual disinfectant levels at the farthest points of the system.

- Disinfection concentrations while the water is pumped through the distribution system. The purpose is to ensure minimum residual disinfectant levels at the farthest points of the system.

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