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PHYSIO - CHEMICAL ANALYSIS OF GREY WATER IN HISAR CITY, HARYANA – A REVIEW

SANDEEP

Research Scholar, Department of Chemistry, JJT University, Jhunjhunu, Rajasthan

***Corresponding Author: Sandeep: E Mail:** sandeep38277@gmail.com; **Mobile- +91 8059445117**

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ABSTRACT

Different research papers have been analyzed, and data has been gathered regarding the nature of water in Haryana, Hisar city in India. Water is tested based on certain properties. Certain physical and chemical tests determine the nature of potable water. Greywater contains a standardized amount of heavy metals such as lead, mercury and other compounds such as carbonates, etc. Greywater contains a fixed bacterial count such as *E. coli, pseudomonas, Helicobacter pylori, Bacteroides, bacillus*, etc. If the temperature range goes beyond 35-degree Celsius, the microbial activity increases. In this study more than ten research papers were analyzed, and it was found that distinct water samples had high levels of Fluoride, alkalinity sodium, potassium, calcium, magnesium, carbonate, bicarbonate, chloride, sulfate, and higher conductivity of the water. All of these factors were in contradiction to the WHO standards. The concentration of Fluorine was found to be higher than the Indian and WHO standards that can cause fluorosis of bones and teeth in the water samples of Hissar city.

Keywords: Greywater, physical, chemical properties, grey water, heavy metals, fluorine, WHO standards

INTRODUCTION

Earth is 97 per cent composed of water. The water is divided into two kinds; freshwater and salty (sea) water. The freshwater that is found under the ground is the primary source of water for humans, and almost one-third of the population of the world uses clean water for drinking. The ground water has many substances, minerals present in it, 175 are almost organic, while 50 per cent of them are inorganic and radionucleotides. Since the advent of the industrial age, the groundwater has been contaminating, and it has become poisonous **[1]**. Clean and pure water is essential for life, for social and economic processes. People around the world are not getting the supply of clean and potable water; almost 250 million people do not have clean water to drink or to fulfil other physical needs of cleaning and cooking. According to an estimate in 2025, 30million population of Earth will face a shortage of clean drinking water. According to the report of World Water Development by UNO, almost seventy per cent of the water is used for irrigation. Groundwater is the largest reservoir for human needs. It is vital right now to save the groundwater, take steps to clean it. The concentration of heavy metals, carbonates and bicarbonates has increased over time due to the contamination of industrial wastes in the soil **[2]**. Today you just cannot take a cup of freshwater and drink it, you will have to pass it through some testing and a few processes of filtration, so it becomes as pure as the standards of WHO (World Health Organization). Many types of water borne diseases such as kidney stones, blindness, diarrhea, etc. Have become common in those areas where water is not purified. There are 17 states in Indi that have been named for Fluorosis including Haryana **[3]**. Fluorine has a durable power of electronegativity, and because of it, it makes its way into the water and other substances. The primary sources of Fluorine are ground rocks such as fluorspar, cryolite, fluorapatite and hydroxyapatite. High quantities of Fluorine in water can damage bones, teeth and affect the activity of the brain. Fluorine levels have been reported as high as 30mg/l of water. It is a threatening state **[4]**.

The municipal wastewater can be divided into three types such as yellow water, brown water and greywater. The yellow and brown water is the water referred to urine or faeces while greywater includes the wastewater collected from showers, baths, kitchen, and toilets, etc. It is urban wastewater. Among these, the greywater, is most suitable for re-use after processing it. The separation of

greywater from others makes it possible to reuse it. The water is separated and treated according to its source.

The greywater can be used for toilet flushing. It can decrease the demand for indoor water by twe-nty per cent. Greywater can also be used for irrigation purpose **[5, 6]**. There have been some oth-er studies carried out which show that greywater can fulfil the needs of flushing and irrigation. A few studies indicate that the grey water of washroom has a low biochemical oxygen demand BOD, nitrogen and phosphorus, and it can be called the cleanest greywater. As the laundry water h-as the addition of detergent and its ph. has been changed due to the presence of sodium, phosph-orus, surfactant, and nitrogen **[7]**. Groundwater quality assessment in the village of Lutfullapur N-awada, Loni, District Ghaziabad, Uttar Pradesh, India. 2012 There have been some other studies carried out which show that greywater can fulfil the needs of flushing and irrigation. A few studies indicate that the grey water of washroom has a low biochemical oxygen demand BOD, nitrogen and phosphorus, and it can be called the cleanest greywater. As the laundry water has the addition of detergent and its ph. has been changed due to the presence of sodium, phosphorus, surfactant, and nitrogen **[7]**. The greywater of kitchen has high amounts of oils and food debris in it and is known as the most polluted greywater. It also has some microbial contaminants despite fecal bacteria. The faecalis concentration in bathroom greywater also exceeds one × 107 CFU/100 ml which poses a risk of health even in reuse **[8]**. If untreated greywater is used there is a higher chance that it can affect the digestive tract and respiratory tract of the bodies. Sometimes the aerosols can be inhaled, and humans can get infected.

METHODOLOGY

Site specification and sampling

Haryana is a beautiful small state n India in its Northern region. It has an area of 44,212 sq. Km and it is the 20th state of India which came into being on 1st November in 1996. The strategical location of Haryana is in the north between 27 deg 37' to 30 deg 35' latitude and between 74 deg 28' to 77 deg 36' longitude. Uttar Pradesh surrounds the eastern bordering area of the Haryana, and western region touches Punjab, Shivalik Hills are present in its Northern border while Southern border reaches Delhi and Rajasthan. Chandigarh is the capital city of Haryana state **(Figure 1)**.

Geographical details of Hisar

Hisar is one of the major cities of Haryana, and it is allocated at 29°9'11" north latitude

and 75°43'6" east longitude and is almost 165 kilometers northwest of Delhi. The city is developing rapidly in Northern India. We have divided the area Hisar City is divided into four different zones to carry out the study, and the details are shown in **Figure 2**.

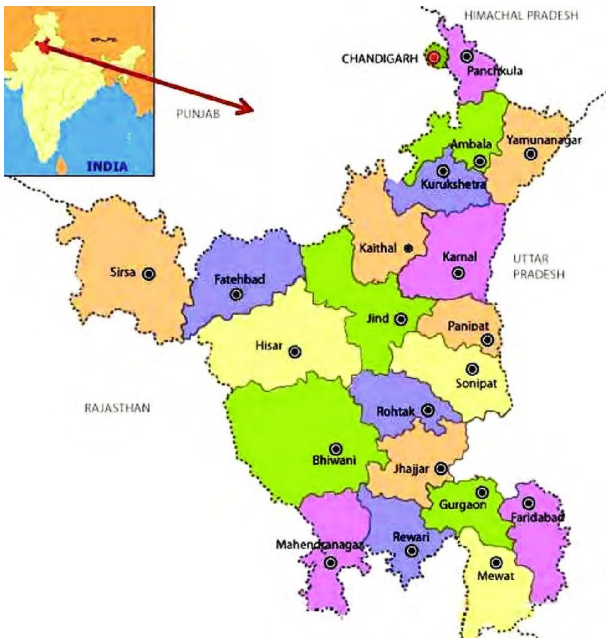

Figure 1: The Map of Haryana State

Figure 2: Hisar District, our study area (divided in four zones)

Water Sampling

The city of Haryana was divided into four quadrants. Different groundwater locations were used to collect the water. Pre cleaned and sterilized cans were used to manage the water, and they were then stored in iceboxes. Different methods were used to test the samples for studying numerous physicochemical parameters which were; electrical conductivity, Fluoride, total dissolved salts, pH, sodium, chloride, Sulphate etc.

METHODOLOGY

The sample collected were studied for the following major chemical and physical parameters:

A pH tutor was used to determine the pH of the water.

The electrical conductivity was determined using a standard conductivity meter

Gravimetric analysis technique was used to test the total dissolved solid (TDS)

Hatch Spectrophotometer Model DR-2900 was used for determining F- ion concentration in the water samples.

The concentration of Sulphate was determined nephelometrically by using ELICO CL-52 Nephelometer.

Argentometric titration method used for the determination of chloride **[9]**.

A formula from USSL, 1954 was used to calculate TDS. The fluoride concentration in water was determined spectrophotometrically using the Hatch Model DR-2900 spectrophotometer. A standard solution of SPENDS was used to find the content of the Fluoride in the water samples. Double glass distilled water was used in all procedures. Each step was performed thrice, and the results had a variation of ±3% error **[10]**.

RESULTS

The water samples had no colour, bad or good odour or any kind of turbidity. The taste of the water from a few areas was a little brackish because of the difference of the minimum and maximum Physico and chemical parameters difference, as shown in the **Table 2**. The ph. of the water was found to be from 5.6 to 8.8, and different regions had their kind of water due to difference of individual parameters as shown in the **Table 1** and **Table 2**. But it was found that all of the water samples had the physio and chemical properties within the range Indian standards and the standards of the World Health Organization. Some water sample severe slightly acidic, as noted in the study. Different geological factors are responsible for the contamination of Fluoride in the water. Fluoride ion is passed into the water due to leaching because of events such as the weathering of minerals, dissolution of the

rocks and decomposition of Fluoride over a long period. The industrial wastes also contain a high level of F in them and cause the contamination of water. The results showed that almost 25 per cent of the areas had higher levels of Fluoride than 1.5 mg/l. The concentration of Fluoride was found to be in between of 0.5 mg/lt to 2.98 mg/l. People in these areas should not directly drink the contaminated water, and it is the responsibility of the local government to advise specific purification methods to clean this higher and dangerous concentration of GF ions in water. Although some areas also had the content of fluoride ions less than 0.7 mg per litre. By observing the area like Bus Stand, Green Square Market, Dhani Badwali, Vegetable Market, New Model Town and Camp Chowk. The following results were obtained:

Table 1: Chemical characteristics of groundwater of different places of Hisar City (study area)

Zone	Sample No.	Name of place	TDS (mg/l)	Sulphate (mg/l)	Chlorides (mg/l)	pH (mg/l)		Conductivity		Fluoride (mg/l)
Zone-I	S-1	Bus Stand Area	126	104	855	6.92		0.78		1.99
	S-2	Pandav Chowk	103	817	710	6.88		0.89		01.00
	S-3	Auto Market			204	178	289	6.7	0.78	0.62
	S-4	New Rishi Nagar			237	197	335	7.89	0.92	1.98
	S-5	Sec-14			399	337	566	6.75	0.770	1.11
	S-6	Vikas 165 Nagar				858	229	7.35	0.700	1.25
	S-7	Sundar Nagar	167	139	239	6.92		0.671		1.45
Zone-II	S-8	Mill Gate	3221	326	540	7.00		0.81		1.25
	S-9	Vinod Nagar	799	636	561	7.84		0.78		1.32
	S-10	Sector-1,4	122	937	1641	6.99		0.75		1.35
	S-11	Mela Ground	384	899	1129	7.44		0.44		1.56
	S-12	Vegetable Market	952	766	665	6.78		0.89		2.45
	S-13	Shanti Nagar	603	665	796	6.83		0.687		1.16
Zone-III	S-14	New Model Town	499	399	704	7.02		0.77		2.99
	S-15	Jaidev Dhani	754	742	652	7.02		0.79		0.95
	S-16	Camp Chowk	661	726	949	7.2		0.723		2.98
	S-17	Lajpat Nagar	544	451	866	7.12		0.69		1.75
Zone-IV	S-18	Jawahar Nagar	266	288	462	7.35		0.900		0.71
	S-19	Chandan Nagar	184	265	335	7.16		0.76		0.53
	S-20	Sec-15A	978	782	1385	7.48		0.79		0.60

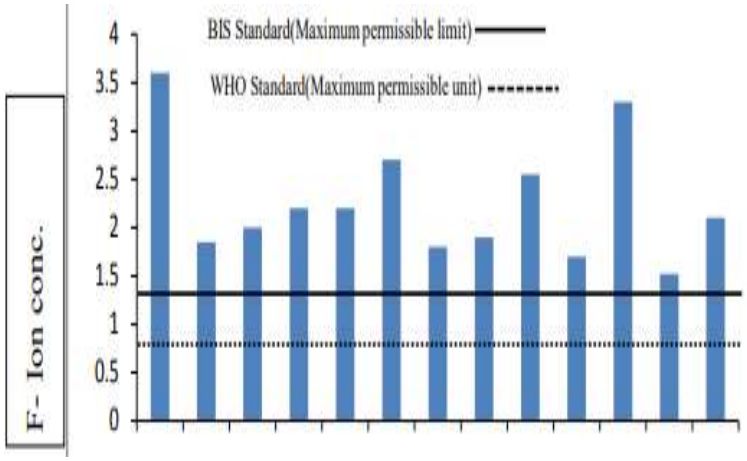

Figure 3: The Graph of the concentration of the F ions

Table 2: Comparison of groundwater quality of different places of Hisar City study area with drinking water standards (I ndian and WHO)

Parameters	Minimum	Maximum	Indian standard	WHO
TDS	103	1878	500-1500	500
SO_4^{2-}	104	1000	200-1000	500
Cl^-	215	1800	200-1000	500
pH	6.4	7.6	7.0-9.2	6.5-9.2
EC	0.5	0.99	0.5-0.8	0.5-0.8
F^-	0.5	2.9	0.5-1.5	1
Except for pH and conductivity all p arameters are expressed in mg/It				

DISCUSSION

The Public Health Department of the Hissar city of Haryana state is responsible for providing its citizens with fresh water. Despite this, there is some area where there is no presence of any tube well and people use underground water for drinking. Our primary focus of the study was to check nature, Physico and chemical

properties of water of different regions in the city of Haryana. Water was found not to contain any kind of odour, color or turbidity. It was seen that water samples had conductivity in a healthy range. Numerous other factors were also studied in this study. The presence of alkalinity sodium, carbonates, bicarbonates and sulfates were also considered. The Fluorine is a highly reactive element of the group Halogen in the Periodic Table. It does not exist in a free state in the environment. It is a highly reactive and electronegative element. The radius of the element Fluoride and hydroxide ions is nearly the same, and they can easily replace each other. Human bodies intake fluoride ions through water and food. The water is responsible for the ninety per cent supply of Fluorine in our collection. Agricultural areas also discharge Fluorine in different forms of compounds in air or soil. The eruptions of volcanoes are also responsible for accumulating Fluorine in the ground. As it has a durable power of electronegativity, the calcium in our bones attracts it easily. Reasonable amounts of Fluoride are responsible for carrying out different processes in the human body, but excess of Fluoride can cause various health problems such as the dental fluorosis, teeth, skeletal fluorosis and deformation of the

bones **[11]**.

There were numerous reasons for the induction of the Fluoride ions in the underground water. Hissar city has various mineral rocks. Different kinds of Fluoride rocks and mineral rocks are present in the town. The leaching processes caused the influx of F ions into the water. The rocks

undergo specific processes such as decomposition, weathering and dissolution. All these processes caused the mixing of higher amounts of Fluoride in the freshwater. Ut but also at the social front such as NGO doctors and philanthropists etc. to save our people **[12]**. Regarding the area under study, defluorination of the groundwater before use and recharging of the groundwater by rainwater harvesting is highly suggested. These measures need to be practiced improving the groundwater quality in this area. Apart from this, many other defluorination devices and techniques such as activated alumina, red mud, Nalgonda technique, magnesia and montmorillonite are also useful and refer to certain limitations **[13, 14]**.

Figure 3: Skeletal Fluorosis and Teeth Fluorosis
Source: Science Direct.com

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REFRENCES

[1] M. Bishnoi, "Potable Groundwater Quality in Some villages of Haryana," 2007.

[2] S. Kumar, "Groundwater Quality of Hisar City of Haryana State,"Sunil K-umar, 2017.

[3] S. A. Mukul Bishnoi, "Porable Groun dwater Quality in Some Villahes of H -aryana".

[4] Manjeet, "Assessment of Quality of G round Water in Some Villages of Gur -gaon District," 2014.

[5] L. *et al*, "Effects of greywater irrigate -on on germination, growth and photo -synthetic chara-cteristics in selected African leafy vegetables," 2016.

[6] P. *et al*, "Contamination of water reso -urces by pathogenic bacteria," 2014.

[7] V. Singh, "Groundwater quality asses sment in the village of Lutfullapur Na -wada, Loni Di-strict Ghazibad, Utaar Pradesh, India," 2012.

[8] D. G. *et al*, "Characteristics and adsor -ption capacities of low-cost sorbents for wastewater treatment: A review," 2016.

[9] R. Shyamal, ". Physico-chemical anal -ysis of borwell water samples of Tel- ungupalayam a-rea in Coimbatore Dis -trict,," 2004.

[10] Manjeet, "Some Villages of Gurgao n District, Haryana, Focus on Fluori-- de," 20.

[11] M. S. A. P. L. R. Shyamala, "Monit oring of physic -chemical and microbi ological analy-sis of under ground wa ter sample. 2014.

[12] I. J. E. Hlth, "Distribution of fluorid- e in groundwater and its suitablity as- sessment for dr-inking purpose.," 200 6.

[13] G. Alagumuth, "Chemometric Studi es of Water Quality Parameters of S-a nkarankovil Bl-ock of Tirunelveli," 2 010.

[14] D. S. B. A. S. D. M. Vinod K Singh 1, "Groundwater quality assessment i- n the village o-f Lutfullapur Nawad-a, Loni District Ghaziabad, Uttar Prade -sh, India," 2012.