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Groundwater Pollution Contamination Caused By the Presence of Fluoride and Nitrate in the Water of Manesar, GURGAON, Haryana, India: A Case Study

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Abstract

It is impossible to survive without water .Around 80 percent of the worlds waste water is dumped directly in the groundwater which goes back to environment polluting rivers ,lakes and oceans unsafe drinking water kills more people as compared to any other epidemic .It is said that less than 1 % of earth fresh water is actually assessable to us .In the present study ,the physico chemical characteristics (Fluoride, Nitrate) of the groundwater of Manesar area of District Gurgaon, Haryana, India were assessed for its consumption for drinking purposes. A total of 30 samples were taken from near about 12 sampling sites all the samples were from borewells, tubewells. Water samples were tested in lab for the following physciochemical parameters like (TDS) Total Dissolved Solids, (EC) (Electrical conductivity, Fluoride, Nitrate. The results were compared with the Standards prescribed by (WHO) and Bureau of Indian Standards (BIS). Standard deviation and Standard Error calculation is also being done on the sample concentration of Fluoride and Nitrate. (EC) Electrical conductivity in all samples was found above 400 u/cm and (TDS) value in all samples was found above 500 mg/l. Fluoride concentration found in few village samples of Manesar area is found to be above 1.5 mg/l (limit prescribed by WHO. Where-as some of the other villages like have fluoride concentration in their groundwater samples with in limit prescribed by WHO (1.5mg/l). Nitrate concentration found in the ground water samples some of the village found to be above (45 mg/l) (limit prescribed by WHO) whereas in groundwater samples of few village samples were found to be having nitrate concentration between 40 to 45 mg/l (limit prescribed by WHO). It is advised to community to use ground water only after properly treating it to avoid getting affected by Diseases caused by the contamination of Drinking water..

Keywords: Ground water contamination; Groundwater; Agriculture

Introduction

Many Ground water contamination commonly occurs when man made products like gasoline, oil, road salts among other harmful wastes makes their way into the groundwater making it unsafe for drinking purpose. In general the two major contributors of groundwater containments are industrial activities and landfill sites. When the contaminants from these mentioned activities reaches aquifer recharge zones it gets mixed up with groundwater thus making unfit for human use. Studies haves shown that when the contaminant water with Fluorides and Nitrates is consumed for a longer duration it affects human health. Some of the common disease like Fluorosis, Arsenicosis and methemoglobinemia occurs with the excess of consumption of Fluoride, Nitrate and Arsenic present in the ground water.

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Fluoride contamination is common all around the world. Some of the main sources of fluoride in ground water are from Fluorapatie, a common mineral, by-products from oil refining, steel manufacturing and brick activities. Phosphatie fertilizer plants are also a major contributor of Fluoride presence in groundwater [1]. Fluorine found in rocks due to the process of rock water interaction released into the groundwater causing increase of fluoride concentration in the groundwater. Fluoride contamination has a serious effect on the health of adults and children [2].

Another source of fluoride content is from the water containing sodium carbonate, water which is calcium deficient. Alkaline water helps in mobilizing fluoride from fluorite [1]. Increase in concentration of Fluoride causes several diseases when consumed for a long period of time. Studies have shown that diseases such as Dental and Skeletal fluorosis are commonly observed in humans who have consumed fluoride contaminated water [3]. Fluoride enters in human body also from the food sources like intake vegetables and fruits which have been grown using contaminated ground water. Studies have shown that Fluoride contamination effects young children. Traces of Fluorides were observed in their nails and superficial layer of enamel of permanent teeth of children [4].

Among some of the major cases reported for high level of Fluoride contamination are from African continent major source of Fluoride contamination is natural volcanic activities especially in sub Saharan Africa region. In case reported from Canada near St. Lawerence river area. Her aluminium plant situated near river bank was source of fluoride in groundwater effecting livestock in the area, mainly cows. New cattle are being born with the stunted growth and dental fluorosis. Fluoride presence in cow fetus (7 month old) was observed around 500 ppm [5]. Fluoride contamination is not dangerous also when contaminated in range (1.5 mg/l by WHO). It is always beneficial for the human body, Fluoride solution is applied for the reduction of dental caries [5].

Dry farming is being practiced since 1900, which has resulted in oxidation of organic nitrogen in the soil to form nitrate. Fertilizers were heavily used to overcome the lack of water for irrigation, thus gradually leading nitrate from the fertilizers leached from ground and reached water table resulting in the ground water contamination [6]. U.S environmental protection agency has set the maximum contamination level of nitrate in drinking water at 10 mg nitrate-N/L but in agriculture areas this level exceeds beyond the prescribed limit [6]. Other factors which contribute to the nitrogen contamination in groundwater are mostly degraded water through fertilizers, pesticides and industrial waste [7]. Another source of nitrate contamination in the groundwater is Landfill leakage and Agricultural Leachate (oxidation of soil containing humus or nitrogen fertilizer) this serve as important source of nitrate pollution [8]. Sanitation is important, sometimes the absence of reliable sewer system directly result in the poor water quality [2].

Nitrate occurs in the both formsie synthetic and natural. Both of these have several negative effects on environment and living beings [9]. Nitrate coming directly from agriculture field runoff and mixes in the water of pond, lake situated nearby resulting in excessive growth of algal bloom and eutrophication which results in release of toxin in the water making it unfit for the drinking purpose also killing of many fishes due to shortage of oxygen in the water. Whereas it also lead to be the cause of loss of macrophytes which thrive in only clean water [4]. Such long term exposure of Nitrate to living beings and environment had lead to extinction of certain species [5].

Crop rotation technique can prevent nitrate contamination of groundwater [6]. Different types of crops take different amount of nitrogen from soil. Some crops don't require large amount of nitrogen based fertilizers as compared to other crops. By applying such technique we can prevent soil from getting exposed to the high amount of nitrate so less amount of nitrate will leach into the soil. Nitrate contamination may cause several health effects like methamoglobinemia it occurs due to consuming too much nitrogen which affects blood's oxygen carrying capacity, it mainly affects infants causing their skin to turn bluish in severe cases, in some cases this may lead to death of the infant (minnisota department). Due to active pesticide

and fungicide in the environment various diseases can occur inside the human body like hematopoietic cancer, immunological abnormalities and adverse reproductive and developmental effects have been reported [10]. There are some reports which says that if high dose nitrate when consumed through food and water it inhibits iodine uptake and result in inducing changes in thyroid gland [11].

Fluoride contamination above than the prescribed limit of WHO guidelines (1.5 mg/l) above it water is unfit for drinking purpose. It is widely prevalent inseveral states of India particularly in the states like Andhra Pradesh, Assam, Bihar, Chhatisgarh, Delhi, Gujarat, Haryana, Jammu &Kashmir, Utter Pradesh, Rajasthan, Maharashtra, Kerala, Karnataka, Punjab, West Bengal are some of the states.

Several case studies have been done already in these states indicating that the ground water of these states has been contaminated by Fluoride. Some of them are mentioned here [12].He has done this study in Pokhran area of State Rajasthan, India. The study was carried out to locate the hydro-chemical reactions responsible for elevated concentration of Fluoride in this area. The concentration of Fluoride ranged from (0.6 to 4.74) ppm. In an another study done in Northern Rajasthan water samples of ground water taken from hand pumps showed a range of 4.78 to 1.01 mg/l of fluoride presence in them and average fluoride concentration of the region was recorded 2.82 mg/l. Another study conducted in Andhra Pradesh rural area reported presence of 0.4 to 5.8 mg/l range of Fluoride in the collected water samples with a mean of 1.98 mg/l. This study also states that alkaline nature of water is responsible for dissolution of fluoride bearing rocks. (Narsimha Adimalla et al.2019) (Kousik Das et al.2016) has done a study in the Simlapal block of Bankura District,West Bengal to find a correlation between fluoride exposure dose with dental fluorosis(DF) and urinary fluoride concentration (UF), Intelligence Quotient(IQ) and Body mass Index(BMI).Following study was done in the form of survey on 49 children in between age group of 6 to 18 years results revel that fluoride concentration of area was found to be 2.11 mg/l.

Similarly Nitrate concentration has been reported from several States of India. States like Andhra Pradesh, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttrakhand, Uttar Pradesh. Several studies of Nitrate had already been done in India too some of them are mentioned here the following study was done on the ground water of Kadava River Basin, Nashik, Maharashtra, India. In this study an attempt was made to develop Artificial Neural Network (ANN) for the prediction on ground water nitrate concentration in the concerned area. The 40 collected samples from the Bore wells confirmed that 67.50% and 75% of ground water samples collected have NO3 concentration above the permissible limit of BIS (<45 mg/l).Another study done in heart of India that is Kashmir by Kumar. Ground water pollution has been reported from many aquifers because of high concentration of NO3 in the ground water which was due to use of excessive fertilizers in the fields. Samples collected in the winter season showed that Nitrate concentration in the samples was above 50mg/lexceeding WHO prescribed limit (45mg/l). Nitrate has been reported in drinking water and vegetables a study done by Sen showed that daily intake of vegetables and drinking water exceeds the prescribed limit of BIS for Nitrate consumption that is 45 mg/l. did a study in Anantapur District A.P, India the water samples collected were tested for different parameters showed that 65% of samples found were unsuitable for drinking purpose having concentration of Nitrate above 45 mg/l that is a prescribed limit by BIS. In the present study Fluoride and Nitrate Concentration has been observed in the Manesar area of Gurgaon District, Haryana, India.

Study Area

The present study is been conducted in the Manesar. Manesar lies in the Gurgaon district of the Haryana state in the Northern part of India. Geographically, Manesar is located between 28.57°N latitude and 77.23°E longitude. Average N.S level of area

is 200-220 m above MSL and all towns/villages of districts are well interconnected by road network. More than 100,000 people travel to work in Manesar from adjoining places on daily basis. The Gurgaon-Manesar Master Plan projects the population of 37,000,000 by 2021. Manesar is 32 km from IGI Airport and is just 16-23 km from Gurgaon and has some of the best urban infrastructure in Northern India. Located on National Highway 8, is served by local buses and trains plying on this route. The area is well connected with Delhi, Rewari, Dha ruhera, Jaipur, Ahmedabad and Mumbai; air connectivity is equally good. The nearest railway station is Ghari Harsaru (GHH) renowned station in Gurgaon.

Levocetirizine Topography, Soil and Geology

The major part of Gurgaon district is underlain by Quaternary alluvium consisting of sand, clay and silt. The quartzite ridge trending NNE-SSW is located about 7 km east of town in which ground water occurs in fractures, joints and crevices. Sandy layers at various depth form major water bearing horizons above the crystalline basement. Ground water in the block occurs in unconfined and semi-confined condition. The upper zone of saturation consists of fine sand with silt varying from place to place. In Udyog Vihar (city area) the depth of first aquifer varies from 34 to 43 m below ground level. However in industrial area of Manesar top most aquifer can be encountered at 20m. The thickness of sandy layer is very limited. The draw down is generally high indicating absence of highly potential ground water bearing aquifers. Tube wells in the depth range of 45 to 90 m below ground level have been installed by different agencies in the block. The yield of these tube wells varies in different areas ranging within 129 to 606 lpm.

The area is conspicuously flat topography; however, in the North-Eastern part small isolated hillocks of Precambrian rocks are exposed. The alluvial plain is formed by the Sahibi river which is tributary of river Yamuna. Soils of the Gurgaon district are classified as tropical and brown soils, existing in the North-Western extreme, Northern and North-Eastern parts of the district and water logged and salt affected soils in the Southern parts of the district. The soils are medium textured loamy sand is the average texture in Gurgaon and Sohna blocks. In Pataudi and Sohna blocks the organic content of soils is lowest, just up to 0.20 per cent (very low category). In the rest of the district, organic content is 0.2 to 0.40 per cent and falls in low category. The Gurgaon district is occupied by Quaternary alluvium and Pre-Cambrian metasediments of Delhi Super Group. The alluvium comprises of thick beds of fine to coarse-grained sand with alternating layers of thin clays.

Climate

The climate of the district can be classified as Tropical Steppe, Semi-Arid and Hot which is mainly characterized by the extreme dryness of the air except during monsoon months, intensely hot summers and cold winters. During three months of south west monsoon from last week of June to September, the moist air of oceanic origin penetrate into the district and causes high humidity, cloudiness and monsoon rainfall. The period from October to December constitutes post-monsoon season. The cold weather season prevails from January to the beginning of March and followed by the hot weather or summer season which prevails up to the last week of June. The mean daily maximum temperature is about 41°C in the months of May and June. It may go up to 45°C or more in June. During winter the mean daily maximum temperate in January in 21°C and minimum is about 3-4°C. May and June are the hottest months and January is the coldest month. The district experiences dry air except during the monsoon, hot summer and cold winter. The average annual rainfall for the five years i.e. 1995-99, 1996-2000 and 1997-2001was 665.2, 628.4 and 560.1 mm respectively it increases towards east. About 77 per cent of annual rainfall in the district is received during the monsoon months. The normal annual rainfall in Gurgaon district is about 596 mm spread over 28 days. The south west monsoon sets in the last week of June and withdraws towards the end of September and

contributes about 85% of the annual rainfall. July and August are the wettest months 15% of the annual rainfall occurs during the non-monsoon months in the wake of thunder storms and western disturbances.

Groundwater

Large parts of the Haryana plains constitute a widely spaced topographic depression between the Siwalik hill and the Aravali Hills which has created the typical internal drainage conditions. Resultantly, while there is a falling ground water table zone in Eastern and Southern parts (Yamuna Nagar, Karnal, Manesar, Sonepat (part), Faridabad and Gurgaon districts) of the State there is a rising water table zone, leading to soil stalinization and degradation, in the Central and Western parts (Rohtak, Jhajjar, Jind, Bhiwani, Hisar, Sirsa and part of Sonepat districts). The State can thus be broadly divided into two distinct zones. The rising water table zone (52% of the State) and the falling water table zone (Eastern and Southern parts). The water supply to the Gurgaon district is mainly based on groundwater through tube wells. 100% of the urban population is covered under drinking water supply scheme. The water supply to the villages is met out with the installation of hand pumps by the villager as spot and convenient source of water. The shallow tube wells for irrigation purpose in the district range from 45 to 70m deep, tapping the aquifer from 31m to 50m with a discharge of 400 to 1000lpm. Most of the shallow tube wells are either run by diesel engines or electric motors. The major part of the district is being irrigated through groundwater. A recent estimate, calculated by the Centre for Science and Environment, holds that Gurgaon's water table is declining at an average rate of 1.12 metre every year. The shallow ground water of the district is alkaline in nature (pH 7.25 to 8.13) and is moderately to highly saline. According to permissible limits of Bureau of Indian Standards (BIS), groundwater is mostly unsuitable for drinking purposes in 88% of wells mainly due to high nitrate and fluoride contents that exceed the maximum permissible limits of these parameters which are 45mg/l and 1.5mg/l respectively. Decline of groundwater and salinity is a major problem in the district. Groundwater is declining at a rate with the range of 0.77m/yr (Bilaspur) to 1.2m/yr (Haily Mandi). All the blocks in district are over exploited. (Referred from the National Capital Region Urban Infrastructure Financing Facility Tranche 2 IMT Manesar Water Supply Project) (Prepared by National Capital Regional Planning Board for the Asian Development)

Method and Methodology

Estimation of Fluoride and Nitrate in water

Water samples from various drinking sources like hand-pumps, bore-well, tube-well, were collected from about 30 different locations of Manesar and nearby area District Gurgaon, Haryana. To determine the level of Fluoride and Nitrate present in the groundwater. Geographic location of various sampling sites is mapped by Global Positioning System (GPS).Samples were collected in the pre washed plastic bottles and carried to the laboratory there they were kept in dark till the analysis for fluoride and nitrate is done. Spectrometric techniques are used for determination of nitrate in water .Detection range from 0.01 to 1 mg/l. (ISO 1986-1988) Molecular absorbtion spectrophotometric method is available for determination of nitrite into portable water, raw water and waste water. Detection lies between the range of 0.005 to 0.01 mg/l. (ISO 1984)

Nitrite and nitrate in water can also be determined by liquid chromatography. In a level of 0.1 mg/l for nitrate and 0.05 mg /l for nitrite. A UV Visible Spectrophotometer was used for the experiment with 1 cm quartz cell were used for absorbance measurements.

Estimation of Nitrate: To estimate Nitrate in water sample Chromotropic Method is used this test is done on Spectrophotometer machine. Acid washed glass wares are used for the experiment. A Nitrate standard curve is prepared range from 0.1 to 100ppm by standard nitrate solution. Appreciable amount of suspended matter present is than filter suitably

then pipette out 2.0 ml of each Nitrate solution sample and water blank into dry 10 ml test tube. Added 1 drop of Sulphite – urea reagent (place flask in tray of cold water) and then added 2 ml of Antimony reagent swirl gently during addition of each reagent. After 5 min added 1 ml of Chromo tropic acid and let it stand for 3 minutes. 5.0 ml of conc. H2SO4is added to bring the volume 10 ml. The absorbance is read after 45 minutes at 410 nm against Blank on spectrophotometer.

The nitrate concentration of collected water samples is determined by the following relationship:

Nitrate concentration in the Sample solution (ppm) = (Absorbance of Nitrate in Sample Solution(ppm))/(Absorbance of Nitrate in Standard Solution(ppm)) ×Nitrate concentration in the Standard Solution(ppm)

Estimation of Fluoride: To estimate Fluoride concentration in the groundwater samples .SPADNS Method is used for performing this experiment a Visible Spectrophotometer is used experiment is performed in the Acid Washed Glasswares. In 50 ml volumetric flask a aliquot amount of sample is taken. Then 10 ml of SPADNS Zirconyl acid Solution is being added into it mixed well and made up the volume 50 ml now absorbance is being read at 570 nm. Zero of Spectrophotometer is set with reference solution and absorbance of the sample is being obtained .A Standard curve is being made of fluoride concentration in the range of 0.1 to 100 ppm in 50 ml distilled water and treat the same as sample. Appropriate statistical techniques and graphical representation were used for analysis. GIS tools were used to show nitrate and fluoride concentration on the map of the sampling area. The fluoride concentration of collected water was determined by following relationship: Fluoride concentration in the Sample solution (ppm) = (Absorbance of Fluoride in Sample Solution(ppm))/(Absorbance of Fluoride in Standard Solution(ppm)) ×Fluoride concentration in the Standard Solution (ppm)

Survey on Ground water quality and health effects caused by it

An online survey is done in the Manesar area to investigate the effect of ground water fluoride and nitrate on the human health .Parents were asked to fill the questionnaire .Questionnaire was specially designed for school going students questions were based on family, health of family members, socio economic status and life style.

Result and Discussion

In the following study the concentration of Fluoride and Nitrate, EC and TDS of all the samples of Manesar area District Gurgaon, Haryana is been taken. Samples were collected from 12 villages of Manesar area from tube wells and bore wells and following parameters were noted NO3, F, TDS, EC. The results reported a major change in the above mentioned parameters.

Calculation

Standard Deviation is calculated by using this formula $\sigma = \frac{\sqrt{\sum(x_i - \bar{x})^2}}{n-1}$

Where $(x\_i)^-$ represents each value from the total samples and x^- represents mean of the total samples.

N represents total number of collected samples and σ represents Standard Deviation

Standard error is calculated by using this formula $SE = \frac{\sigma}{\sqrt{n}}$

The following table clearly states that the groundwater quality of Manesar area is thoroughly deteriorated Parameters like EC range in above samples is above 400 us/cm. (limit prescribed by WHO) TDS range in mostly samples is above 500 mg/l (limit prescribed by BIS). Fluoride concentration found in few village samples of Manesar area is found to be above 1.5 mg/l limit prescribed by WHO. Villages like (IMT SECTOR 1, Manesa, Baskusla,Naurangpur, Bhangrola) have concentration of

fluoride above 1.5 mg/l (prescribed by WHO) in their ground water samples. Whereas some of the other villages like Kakrola, Kasan, Khoh, Nainwal, Sehrawan have fluoride concentration in their groundwater samples with in limit prescribed by WHO (1.5mg/l). High Fluoride content in groundwater it could be from iron, steel production industries, petroleum refining industries and phosphate fertilizers used in the fields which lead to be a main cause of dental fluorosis.

In a same way Nitrate concentration found in the ground water samples of villages like Khoh, Naurangpur, Dhana, Rampura, Baskusla is found to be above (45 mg/l) (limit prescribed by WHO) where-as in groundwater samples of villages like Kasan and Bhangrola few of the samples were found to be having nitrate concentration between 40 to 45 mg/l (limit prescribed by WHO). Higher nitrate content founded in the samples also leads to be a cause of methaemoglobinemia (blue baby syndrome) a disease commonly found in infants.

The Water Pollution Control Board reported that there are 19 states in India which have fluoride concentration more than the permissible limit. Haryana is one of them 14 districts in Haryana namely Gurgaon, Mewat Hissar, Jhajjar, Jind, Kaithal, Kurukshetra, Mahendragarh, Panipat, Rewari, Rohtak, Sirsa, Sonepat have fluoride concentration more than 1.5 mg/litre permissible limit as prescribed by Bureau of Indian standards (BIS) in groundwater wells. Many studies were carried in many districts of Haryana to investigate fluoride concentration in groundwater that includes Panipat, Hisar, Jind region, Bhiwani region and Gurgaon region. The report submitted by PHED (Public Health Engineering Department Haryana) against a PIL states that the data shows the city has seen a massive increase in fluoride and nitrate levels in its groundwater. More worryingly, lead and cadmium have also been detected. Nitrate levels have gone up by 60%,from 27.30 mg/l to 44 mg/l, between 2016-17 and 2017-18. In the same period, concentrations of chloride and fluoride have risen by 160% and 17%, respectively. While the highest fluoride level in 2016-17 was 4.7 mg/l, it rose to 5.5 mg/l in 2017-18. Meanwhile, the chloride levels rose from 1,500 mg/l to 4,000 mg/l. At a few places, total dissolved solids (TDS) levels also rose from 3,011 mg/l to 5,140 mg/l. Iron levels, though, fell from 0.90 mg/l to 0.35 mg/l in the same period. PHED also gave a list of 37 areas near Manesar, Farrukhnagar, Sohna Road and Sohna, where it has termed groundwater 'non-potable'. The Central Pollution Control Board (CPCB), in 2017, had already informed that groundwater of Bandhwari, Dera and Manesar villages are 'unfit' to drink.(Times of India) Sucheta Yadav et al.2019) studied the presence of Fluoride concentration in the groundwater samples of District Mahendergarh and found concentration of fluoride in the samples between 0.3 to 0.16 mg/l found Fluoride concentration in the water samples of Hisar District, Haryana. Bhupinder Singh ,V.K Garg 2006)(the mean concentration of fluoride in Pataudi ,Haily mandi and Harsaru village was between 1.68±0.35,3.22±1.18 and 1.78±0.12 mg/l. did study on Urinary fluoride samples and Drinking water in the Children of Jhajjar District, Haryana he found dental fluorosis between the stages of yellowish brown, Chalky white and Brownish Black find severity in the case of Dental Fluorosis in children (1.48 ±2.14 mg/l). Kaur also reported a change in level of fluoride in the ground water of Jind District (0.3 to 6.9 mg/l) he studied the groundwater condition of Ambala District, Haryana has found Fluoride level within the concentration limit as prescribed by WHO that is (1.5mg/l). Whereas reported Fluoride concentration (18.5 to 16.6 mg/l) from Sainiwas locality of Bhiwani district Haryana. Another study done in Ambala District Haryana also reported increase in Fluoride concentration (1.72 to 1.98 mg/l) which is more than the prescribed limit by WHO (1.5mg/l) did study in Panipat District Haryana to know the non-carcinogenic human health risk caused due to intake of Fluoride and Nitrate contaminated water And results indicate that children are more health risk of non-carcinogenic than the adult population also did same kind of study on the groundwater of South western Haryana in Bhiwani District he studied on different parameters like Calcium, Hardness, Ph, TDS, Magnisium, Sulphate, Bicarbonate and Fluoride but he founded immense increase in concentration of Fluoride levels he reported fluoride as the major problem in the groundwater contamination in the Haryana he reported (86 .0 mg/l) Fluoride concentration from the Motipura village which is ever recorded highest concentration of fluoride till now.

They did study on the quality of water of Jhajjar District and reported an increase in several parameters including Fluoride and Nitrate. Mukul Bishnoi did study on the groundwater of Hisar on various parameters and found Fluoride concentration between the range of (0.24 to9.27 mg/l) did study on Markanda River of Kurukshetra District to know the Surface Water Quality of the River he also reported that High level of Nitrate content was found in the well water of Haryana (99.5 mg/l) the reason of this increase is excessive nitrogen fertilizer in the crop fields in Haryana. Similar kind of study was done by in the Farukhnagar area of District Gurgaon to know the Nitrate level in the ground water of Haryana District he found Nitrate level in the groundwater of tubewells of Farukhnagar area (56.19 to 91.36) which is more than the permissible limit prescribed by the who (45 mg/l).

Conclusion

The major part of area is lined by Quaternery alluvium consist of sand, slit and clay which helps in release of Fluoride in the groundwater through weathering and soil erosion. Manesar is the fastest growing industrial town with almost every kind of industry in it agricultural activities take place only in North west part of IMT Manesar within this area industries also lies along with agriculture which mostly lead to contamination of water both by industrial chemicals and agricultural fertilizers following study done in Manesar area is mainly done to bring focus of government authorities on the deteriorating condition of the ground water of this model town area so that necessary action should be taken in her review paper she mentioned the need for in situ and ex situ treatment method implementation in large part of haryana in fluoride affecting areas to manage the detoriation of groundwater quality of Haryana. This study highlighted the contamination in the groundwater of Manesar area with excess of Fluoride and Nitrate level in the groundwater of Manesar area. The ground water contamination by fluoride and nitrate may lead to be the cause adverse health effects on humans. Health effects like Methemoglobinemia (blue baby syndrome) which mainly occurs in the infants which reduces the oxygen intake capacity of the infent. From excess of fluoride consumption disease like Dental fluorosis may occur. Ground water should only be consumed after proper treating it to avoid excessive consumption of Fluoride and Nitrate.

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