



A study to Assess the effect of Ground water Quality and its Impact on Human health of People of Indore City, India

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Abstract

Indore is one of the largest cities of central India. The population of Indore is crossing mark of 3 million people. Water is the basic necessity of our life and it is an important natural resource which form's the core of natural ecological system. I have tried our best to study the local water conditions scientifically along with past history. Due the increase of population limited source of water we have tried to full fill the need of water from various sources like the dug wells, tube wells, local water bodies (lake and pond) and from the river Narmada which is situated about 70 km. from Indore town. Since last five years it is observed that people who are dependent upon the tube wells are suffering from some of the disease like constipation, kidney problem, hair loss, graying of hair, acidity etc. i. Objective of study is to find out the quality of ground water and its impact on mankind. ii. To know more about the chemicals present in the groundwater in different areas(Ca & Mg), iii. To find out the effect of excessive groundwater calcium on human health. Data has been collected through experimental method and observation. The result of chemical analysis of water shows that water of tube wells contains calcium carbonate, bicarbonate, magnesium carbonate in excess (more then standard limits) this excess of calcium is the responsible for the above mentioned diseases. Public awareness for the use of this groundwater is done by contacting the people and by public of this area also the news paper etc. Some remedial methods also suggested for the use of this water. I am sure if people take precautions they can be protected from such diseases and they can enjoy healthy and cheerful life.

Keywords: Impact, human, health, calcium carbonate, water quality.

Introduction

Ground water is one of the major sources of water which full fill the requirement of mankind in different sectors from last few decades. It plays an important role to enhance the economics of India and ensures food security. Due to rapid industrialization, urbanization and agricultural development causes several type of contamination in ground water resources in various part of country which result many harm full effect towards environment. The central ground water board is being monitored to check the quality and aspects of ground water samples in the country.

In concern about deterioration in ground water quality a meeting has been conducted on sep. 2007 by Advisory Council on Artificial Recharge to ground water and a report is submitted by Central Ground Water Board on "Quality of ground water in shallow aquifers in India."

Indore is one of the largest towns of central part of India. The population of Indore is about crossing a mark of 3 million people. Under is the basic necessity of our life and it's a important natural resource which forms the core of natural ecological system.

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increasing every day and gradual exhaustion of surface water taking place. At present the major part of water supply is done by the river Narmada which is situated about 75 k.m. from Indore. Old dug wells and new tube wells are also helping in full filling the water demand of the town. Since last five years it was observed that people who are drinking water of the tube wells and dug wells are suffering from constipation, kidney problem, hair loss, graying of hair, acidity etc.

The result of chemical analysis shows that water of this flow contains lot of calcium carbonate, bicarbonate, magnesium carbonate in excess (more than the standard limit).

The quality of ground water is also effect by several type of environmental pollutants for example due to uncontrolled use of Fertilizer Pesticides, Insecticides in agriculture and irregular disposal of industrial waste and domestic waste increases day by day which result contamination in ground water sources. The ground water contents a broad range of dissolved inorganic chemicals in various concentrations. Such as chloride, nitrate, fluoride, arsenic etc. which are formed by interchange between water and geological materials.

Indore Physiographic: Indore lies on the Deccan plateau at 560 meters from M.S.L. The city area can be divided into two parts. Northern part is almost flat while the southern part is

essentially hilly. In the Northern parts the Basalts flow are almost horizontal forming a typical monotonous trap country. While in the Southern parts the hills are scattered. The whole area look like a vast table land with different elevations between 550 to 800 meters from M.S.L.

Climate: Climate is fairly good. Average rain fall is about 35 inches per annum.

Geology: Indore lies on the Deccan trap. Geographically known as Malwa plateau, which is made up of Basaltic rocks formed as a result of rapid cooling of basic lava. Deccan trap of India represents one of the major tectano-volcanic events of the Tertiary Era (60 million years). Around the town Deccan trap are characterized by plat-topped hills and step like topography which is responsible for variation in hardness of different flows. Some flows are highly weathered. Some are vesicular and amyadolodial with lot of cavities which are filled with secondary minerals like calcite, quartz and other zeolites. The presence of Red-bole and green-earth is also seen¹.

Groundwater Occurrence and Quality in Indore: Columnar joints are quite common which are hexagonal in shape. Minor joints and cracks are also seen which are responsible for holding the Ground water. The Basaltic rocks are not giving much response to the ground water accumulation². Ground water is re-charged every year by the rainfall. The main aquifer lies in the. IInd flow which is present below the depth of 10 to 60 meters³. The movement of ground water depends upon thickness of vesicular zone, depth of weathered zone and the nature of material constituting the over burden. The quantity of water varies place to place. The weathered zone has more water than the hard rock area. Porosity and permeability also plays an important role it the movement ground water.

Objectives and purpose of study: i. Objective of study is to find out the quality of ground water and its effect on mankind. ii. To know more about the chemicals present in the groundwater in different areas (Calcium and magnesium) iii. To find out the effect of excessive groundwater calcium on human health.

Hypothesis: Health of people is affected by the quality of groundwater.

Methodology

The study is the based on data of experimental method and survey method with help of reference laboratory and scientific services¹. The interview of eminent and specialist doctors of Indore city. The basic of interview of doctors we have checked effect of groundwater quality and it's effect on human health.

Ground water quality study: The International Standard Organization (ISO) has defined study as, "The programmed process of samplings, measurements and subsequent recording or signaling or both, of various water characteristics, often with the aim of assessing, conformity to specified objectives".

Study of ground water quality is attempts to get knowledge on various chemicals which can be obtain through different samples of hydrogeological units. Ground water is mainly obtain through hand pumps and springs from hilly areas and major parts of ground water get from dug wells. The main purpose of ground water quality study is to get data on distribution on water quality on various resenal skills and to create and backup information on different chemicals on different chemicals in ground water. Central Government Water Board study the chemical quality of shallow ground water once in a year and this study were based on observation of 15640 wells located all over the country.

Table-1
Average Chemical Composition of Deccan Trap of Indore

Oxides	Percentage
SiO ₂	53.5
Al ₂ O ₃	13.5
FeO	10.9
MgO	05.5
CaO	13.8
Na ₂ O	02.4
K ₂ O	00.4
Total	100.0

Results and Discussion

The geochemical study of the Deccan trap of Indore is done. About 20 samples were analyzed and it was found that percentage of CaO is much higher than that of other basalts (table 1). When percolating water comes in contact with CaO, it mixes with water slowly-slowly and then it fills in the vesicles, joints, openings and fractures. This in due course of time crystallized as well developed crystals of calcite. In the same way Magnesite also deposits in the openings. The IInd flow is highly weathered throughout the Indore and this is having fairly good amount of CaCO₃, which can be seen simply by boiling the water. About 137 water samples were collected from the different colonies of the town and analyzed. It was observed that most of the well is rich in calcium carbonate (table 2).

Conclusion

As can be observed result from the study show that increase of calcium in groundwater and people who are using water from the dug wells since very long time have developed many problems. Hypercalcaemia by the continuous use of calcium rich water the level of calcium in the body. Fluid rises above normal the nervous system is depressed and reflex activities of the central nervous system, making it sluggish. The muscles too become sluggish and weak probably because of calcium effect on the muscle cell membranes⁶. When calcium level rises more than 12 percent in the blood depressive effects are also developed. When calcium level rises more than 17 percent calcium-phosphate is likely to precipitate throughout the body giving rise to parathyroid poisoning⁷. When along with calcium magnesium is also present water becomes quite hard and it does not give foam with soap so people unknowingly apply soap for a longer time which causes the hair lose and graying of hair.

Table-2
Result of Chemical Analysis of Water Samples Collected From Different Colonies of Indore
(Average Depth 20 m) (Wells 137)

Name of Colony	Average of well	Rock Type and flow	pH value	Bicarbonates ppm	Carbonates ppm	Total Hardness ppm	Calcium Hardness ppm	Magnesium Hardness ppm	Chloride ppm	Sodium ppm	T.D.S. ppm	Specific Conductance at 25° C in Micro ahms/cus.
59- Scheme, sabzi Mandi Pipla Pala Vishnupuri	15	Basalt II nd	8.8	135	19.60	180.0	32.00	24.00	20.00	27.00	268	420
Indrapuri Janki Nagar, Chitawad	12	II nd	8.5	125	20.00	205.00	30.00	31.72	50.00	31.00	499	780
Sudama Nagar	17	II nd	8.9	115	32.00	200.00	54.00	15.86	17.50	12.50	345	540
Saket Nagar Manorama Ganj	10	II nd	8.2	95	14.00	225.00	30.00	36.60	40.00	16.50	384	660
Tilak Nagar Kanadia	20	II nd	8.3	85	19.60	120.00	22.00	15.86	22.50	16.00	614	960
Arodram Road	18	II nd	8.5	150	19.60	125.00	24.00	21.96	22.50	42.00	345	540
Scheme No. 54 and 74	20	II nd	8.0	110	19.60	225.00	46.00	26.84	22.50	78.00	307	480
LIG, MIG and Anup Nagar	25	II nd	8.9	135	19.00	120.00	30.00	24.40	32.50	25.30	345	540

Recommendations: i. Public awareness against the use of this ground water is only way to curb the ill-effects. Practically it is not possible to stop people for using this water, but still lot of suggestions can be made for the proper use of water. ii. By boiling the water calcium carbonate percentage can be reduced to standard limits. iii. In a glass of drinking water 2 drops of lemon should be added. iv. Water can also be filtered by any of the method in which diatomite filter method is the best one. By this method filter absorbs practically all the harmful particles and water becomes very good for drinking purpose. The lager diatomite filter has found greatest practical applications in pool, aquarium, industries installation and by the defense. Ordinary cake type of filters can also solve the purpose up to some extent as these porous clay candles also absorb some of the harmful particles.

I am sure if such precautions are taken people can be protected from many such diseases and they can enjoy a healthy and cheerful life.

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