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Physico-chemical analysis of ground water of Kota (Bilaspur Distt c.g) and its surrounding area with special reference to fluoride

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ABSTRACT

The ground water quality is determined in four area of Kargi Road Kota (Coded As Kota S1, Mauhar kha S-2,,Kota Naka chowk S-3, Pipertarai S-4), where from each area ground water samples are under studied for Physico- chemical status of ground water. In Physico-chemical analysis various quality parameter are measured including pH, turbidity, electrical conductivity (EC), total dissolved solids (TDS), total hardness (TH), content of calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride (Cl^-), DO, BOD, total alkalinity (TA) and Fluoride (F^-) concentration present in ground water. Also all parameters were compared with ICMR standards of water quality.

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KEYWORDS

Ground water;
Physico-chemical analysis;
TDS;
Water quality.

INTRODUCTION

Water plays an essential part in human life comprising over seventy percent of the Earth's surface, water is undeniably the most valuable natural resource. Life on Earth would be non-existent without water because it is essential for everything on our planet to grow. The human body is composed of 50-80% water. Blood and muscles contain significant amounts, and approximately 95% of the brain is water. All body systems and organs need water to function properly, and will shut down without it. Most of the chemical reactions that take place in our body need water as their medium. We can live without food for a few weeks, but can survive only a few days without water. It's essential because unlike other nutrients, water isn't stored in the body. Typically,

everyday, we lose around 10 cups of water, just living; urinating, perspiring and breathing. All organisms contain water; some live in it; some drink it. Plants and animals require water that is pure, and they cannot survive if their water is loaded with toxic chemicals or harmful microorganisms. Yet even though humans recognize this fact, the population has disregarded it by polluting the rivers, lakes, and oceans of the world. Consequently, we are harming our planet. The drinking water has become greatly affected, as has the population's ability to use water for farming and recreational purposes. We have lived on this planet for millions of years and we have come to rely on its ability to support and sustain human and animal life indefinitely. The world survives by way of an ecosystem and that system is the core of all living things. For many years now scientists have

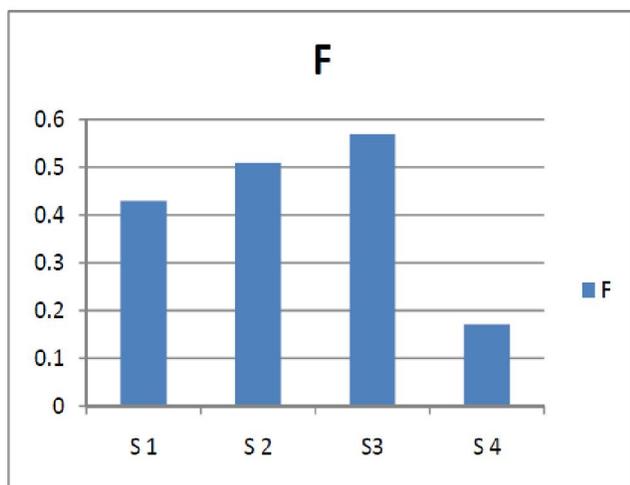


Figure 1 : Graphical representation of fluoride content in various water samples

warned that our cavalier attitude toward preservation of the eco system will cause it to begin breaking down, however, their warnings often fell on deaf ears. In order to combat water pollution, we must understand the causes of water pollution, and ways in which water pollution can be prevented. The present work is an attempt measure the water quality of various water samples of Kota (Bilaspur distt Chattisgarh) and its surroundings with special reference to fluoride. Fluoride is a chemical element that shown to cause significant effects on human health through drinking water. Different forms of fluoride exposure are of importance and have shown to affect the body's fluoride content and thus increasing the risks of fluoride-prone diseases. Fluoride

TABLE 1 : Physico- chemical parameters of water samples collected form Kota Bilaspur And Its Surrounding

S/N	Parameters	Unit	S-1	S-2	S-3	S-4
1	Temperature	°C	24.1	24.4	24.2	23.3
2	p ^H		7.61	7.76	7.56	7.42
3	Electrical Conductivity	µm	49.0	44.2	47.1	44.2
4	Turbidity	mg/li	0.20	0.04	0.10	0.30
5	TDS	ppt	21.2	24.3	24.9	48.2
6	TA	mg/li	25.5	56.8	41.5	75.5
7	Total hardness	mg/li	248	236	272	253
8	Ca ²⁺	mg/li	85	80	103	160
9	Mg ²⁺	mg/li	160	156	169	93
10	Dissolved Oxygen	mg/li	5.6	6.2	7.3	5.9
11	B.O.D.	mg/li	2.3	3.2	3.3	4.1
12	F	mg/li	0.43	0.51	0.57	0.17
12	Cl	mg/li	25.55	56.8 1	41.18	75.26

TABLE 2 : Comparison of ground water quality at the study area with drinking water standard (ICMR)

S/N	Parameter	Minimum	Maximum	ICMR (Desirable Limits)
1	p ^h	7.42	7.76	7.0-8.5
2	EC (µm)	42.2	49.0	300
3	TDS	21.2	48.2	500
4	TH	236	272	300
5	TA	25.5	75.5	600
6	Ca ²⁺	80	160	75
7	Mg ²⁺	93	169	60
8	F	0.17	0.43	1
9	Cl	25.55	75.26	200
10	DO	5.6	7.3	6
11	BOD	3.2	4.1	5

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has beneficial effects on teeth at low concentration of 1 mg/li by preventing and reducing the risk of tooth decay. Concentration lower than 0.5mg/li of fluoride however have shown to intensify the risk of tooth decay. Fluoride can also be quite detrimental at higher concentration exceeding 1.5-2 mg/li of water. High concentration of fluoride pose a risk of dental fluorosis as well as skeletal fluorosis and osteoporosis.

STUDY AREA

Kota (Hindi: कोटा, kota) is a town and a nagar panchayat in Bilaspur district in the Indian state of Chhattisgarh. Kota is located at 22.3°N 82.03°E. kota is also kargi road kota, kargi is a village nr.kota about 12 km distance. As of the 2001 India census, Kota had a population of 15,020. Males constituted 51% of the population and females 49%. Kota had an average literacy rate of 66%, higher than the national average of 59.5%: male literacy was 76% and female literacy was 55%. 16% of the local population was under 6 years of age. The present paper is study of Physico-Chemical quality of drinking water of four sample stations in Kota (Bilaspur and its surrounding area (Coded As Kota S-1, outside Cvrn Campus (Mauhar khar) S-2, Kota Naka chowk S-3, Pipertarai S-4).

EXPERIMENTAL

In present investigation four sampling station of Kota Bilaspur And its surrounding were selected Water sample were collected in the polyethylene bottle of 1.0 liters. Temp, pH, turbidity, electrical conductivity (EC), total dissolved solids were analyzed using Systronic 9 parameter water analyzer, total hardness (TH), content of calcium (Ca^{2+}), magnesium (Mg^{2+}) were measured by EDTA titration method, total alkalinity (TA) was determined by titrimetric method, Fluoride (F^-) was determined by using Systronic Spectrophotometer, DO, BOD and chloride (Cl^-) by standard methods given by NEERI¹⁰, APHA¹. All the glassware first cleaned with tap water, distill water and with solution before final use. The chemical and reagent were used for analysis were of A.R. grade

RESULT AND DISCUSSION

The result of chemical study in water in the present study are recorded in TABLE 1 and all result are compared with ICMR standard of water quality in TABLE 2. The result of investigation indicates that they are in range of water quality permissible limits, but the hardness shows wide variation in all four sampling station. The fluoride contents in water is low due to this no dental and skeleton problem arises in these study area. DO, BOD, TA, Cl⁻ are within the limits

CONCLUSION

From present investigations we concluded that the quality of most of the water samples under study was suitable for drinking and domestic purpose.

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